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ML186 Plus/ML280eco PRINTER

Maintenance Manual

[Rev. 3]

Related drawings

Drawing No.	Name
42590033TL	ML186 Plus/ML280eco Disassembly for Maintenance
42590033TR	ML186 Plus/ML280eco RSPL

BOM		Use for		Certification Body	
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Approval	Tetsuya Kitabatake	Design	Masaaki Sato	Name	ML186 Plus/ML280eco Maintenance Manual
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PREFACE

This maintenance manual describes how to maintain the ML186 Plus/ML280eco printer in the field.

This manual is for customer engineers.

For further information, refer to the Users Manual for handling or operating the equipment.

The relation between the destination point and the model name of this printer is as follows.

Destination point	ML186 Plus/ML280eco
For ODA	ML186 Plus
For AOS	ML280eco
For OEL	ML280eco

Applicable

Part No.	Printer Series	Destination	Voltage	Model No.	AC-Type
42590033	ML280eco OEL 230V	OEL	230	D23320B	
42590034	ML280eco AOS 230V	AOS	230	D23320B	
42590041	ML280eco AUS 230V	AUS	230	D23320B	
42590045	ML280eco T&T 230V	T&T	-	D23330E	
42590046	ML186 Plus ODA 120V Par	ODA	120	D23320A	
42590047	ML186 Plus ODA 230V Par	ODA	230	D23321B	
42590048	ML186 Plus ODA 120V Ser	ODA	120	D23320A	
42590049	ML186 Plus ODA 230V Ser	ODA	230	D23321B	
42590050	ML186 Plus ODA 120V Par DELL	ODA	120	D23320A	
42590051	ML186 Plus ODA 120V Ser DELL	ODA	120	D23320A	
42590052	ML186 Plus ODA 120V Ser(EDW)	ODA	120	D23320A	
42590053	ML186 Plus ODA 230V Ser(EDW)	ODA	230	D23321B	
42590054	ML186 Plus ODA 120V Par DELL	ODA	120	D23320A	
42590055	ML280eco OEL 230V Ser	OEL	230	D23320B	
42590058	ML280eco AOS 230V	AOS	230	D23320B	
42590059	ML280eco AUS 230V	AUS	230	D23320B	
42590066	ML186 Plus ODA 120V Par	ODA	120	D23310A	
42590068	ML186 Plus ODA 120V Ser	ODA	120	D23310A	
42590070	ML186 Plus ODA 120V Par DELL	ODA	120	D23310A	
42590071	ML186 Plus ODA 120V Ser DELL	ODA	120	D23310A	
42590074	ML186 Plus ODA 120V Par DELL	ODA	120	D23310A	

Switching-
Type

Dropper-
Type

Contents

1. CONFIGURATION	6
1.1 Standard Printer Configuration	6
1.2 Options	7
2. THEORY OF OPERATION	8
2.1 Electrical Operation	8
2.1.1 General	8
2.1.2 Microprocessor and Its Peripheral Circuits	9
2.1.3 Initialization	11
2.1.4 Interface Control	12
2.1.5 Print Control	15
2.1.6 SP Motor Control	16
2.1.7 Line Feed Circuit	18
2.1.8 Operation Panel	18
2.1.9 Alarm Circuits	20
2.1.10 Paper End Detection Circuit	21
2.1.11 Power Supply Circuit	21
2.2 Mechanical Operation	24
2.2.1 The Print head Mechanism and Its Operation	24
2.2.2 Spacing Mechanism and Operation	25
2.2.3 Head-Gap Adjusting Mechanism	26
2.2.4 Ribbon Feed Mechanism and Operation	27
2.2.5 Paper Feed Mechanism and Operation	28
2.2.6 Paper -End Detection Mechanism	30
3. ASSEMBLY/DISASSEMBLY	31
3.1 Precaution for parts Replacement	31
3.2 Maintenance Tools	32
3.3 Disassembly/Reassembly of Procedure	33
3.3.1 Print Head	35
3.3.2 Upper Cover	36
3.3.3 PCB-Assy	38
3.3.4 Power supply	39
3.3.5 Operation Board	41
3.3.6 Ribbon-feed Gear Assembly	42
3.3.7 Space Motor Assembly	43
3.3.8 Printer Mechanism	44
3.3.9 LF Motor Assembly	45
3.3.9.1 New LF Motor	45
3.3.9.2 Old LF Motor	46
3.3.10 Space Rack	47
3.3.11 SUMI-CRAD(Head), SUMI-CRAD(OP) assembly *Except for T&T	48
3.3.11 Cable assembly *For T&T	49
3.3.12 Carriage Frame	50
3.3.13 Column Indicator Bar	51
3.3.14 Platen Assembly	52
3.3.15 Paper-chute Assembly	53
3.3.16 Bottom Paper Guide Assembly	54
3.3.17 Near-end Lever and Bracket	55

3.3.18 Bottom Near-end Lever	56
3.3.19 Switch assembly.....	57
3.3.20 Pin Tractor Assemblies (R and L)	58
4. ADJUSTMENT	59
4.1 Head-Gap Adjustment.....	59
4.2 Space Rack and Roller-Gap Adjustment.....	61
5. CLEANING AND LUBRICATION	62
5.1 Cleaning	62
5.2 Lubrication.....	62
6. TROUBLESHOOTING AND REPAIR	63
6.1 Items To Be Checked Before Repair	63
6.2 Finding the Cause of Error	63
6.3 Troubleshooting	68
APPENDIX A PCB LAYOUT	81

1. CONFIGURATION

1.1 Standard Printer Configuration

The standard configuration of the ML186 Plus/ML280eco is as follows:

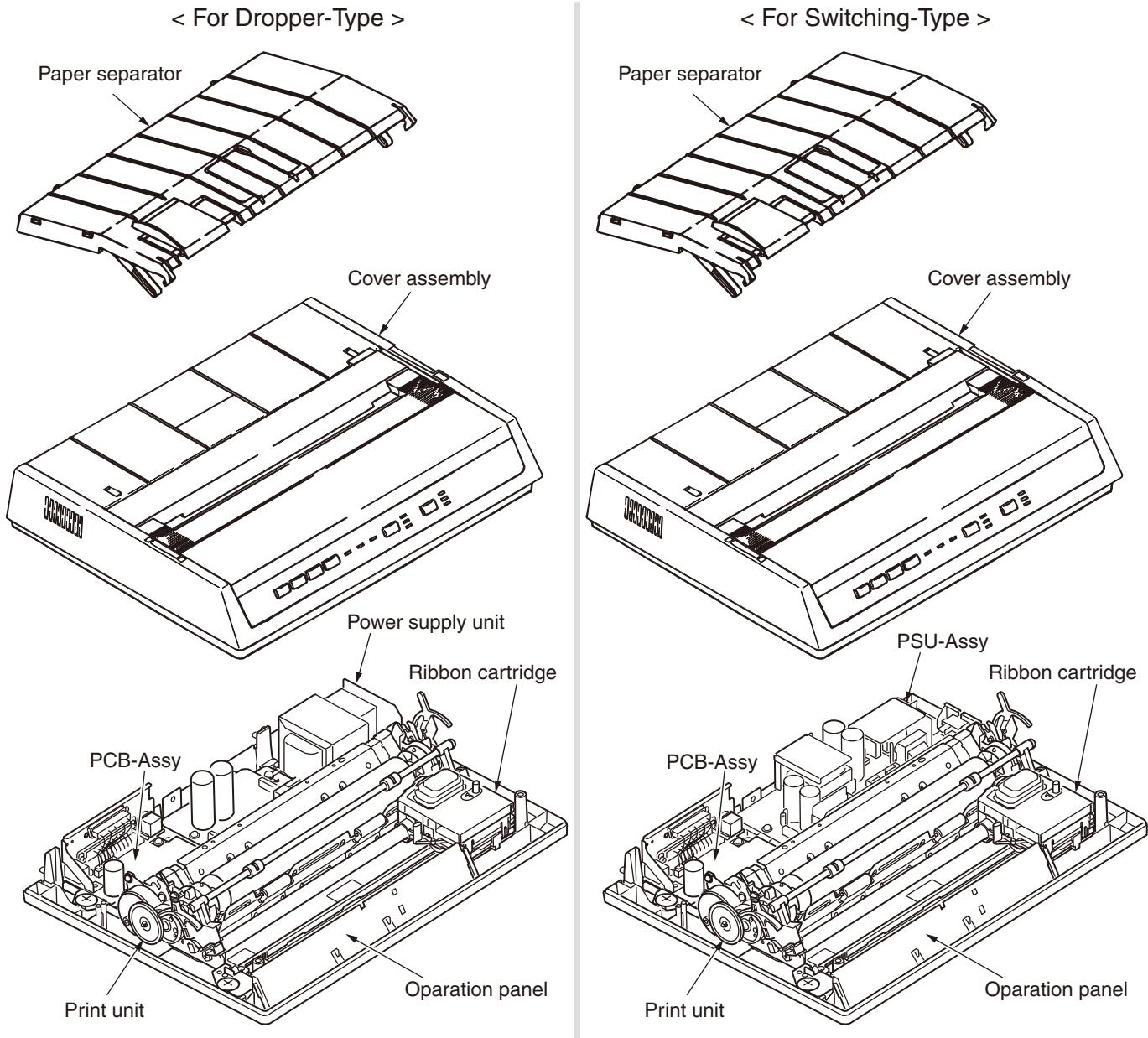
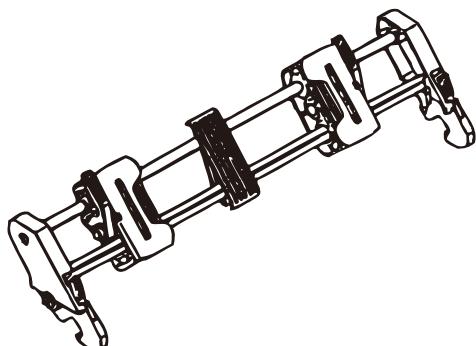


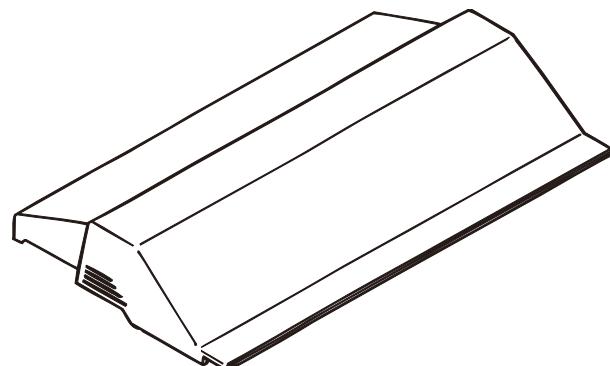
Figure 1-1. Printer Configuration

1.2 Options

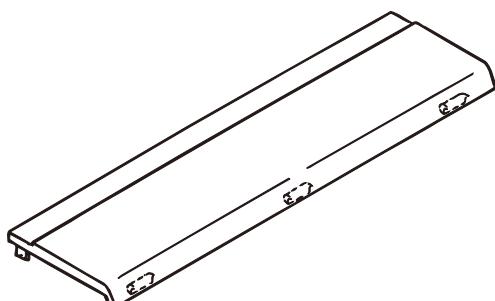
(1) Tractor unit (consists of Pin tractor assy, acoustic cover, and access cover)



Pin tractor assembly

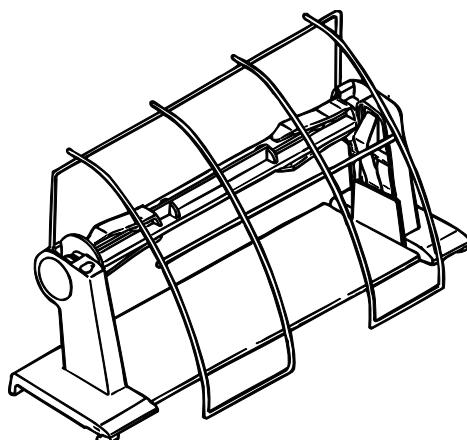


Acoustic cover



Access cover

(2) Roll paper stand



2. THEORY OF OPERATION

2.1 Electrical Operation

This section describes the operation of the printer circuits.

2.1.1 General

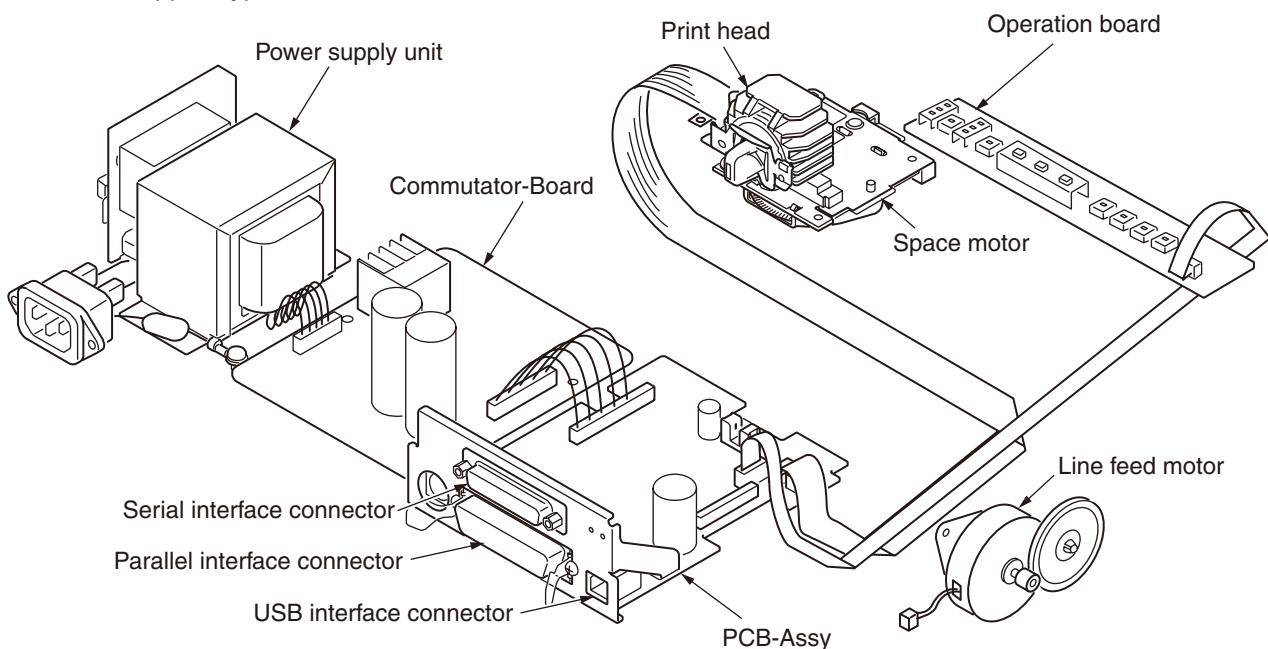
The electrical section of the printer consists of the components shown in figure1.

The PCB-Assy is made up of the SOC (SYSTEM ON CHIP), peripheral circuits, drive circuits, sensors and interface connectors.

The power to the PCB-Assy is supplied by Dorroper-Type: Power Supply Unit and the Commutator-Board, Switching-Type: PSU-Assy through the connector cord.

The power to other electrical parts is also distributed through the connectors within the PCB-Assy.

< For Dropper-Type >



< For Switching-Type >

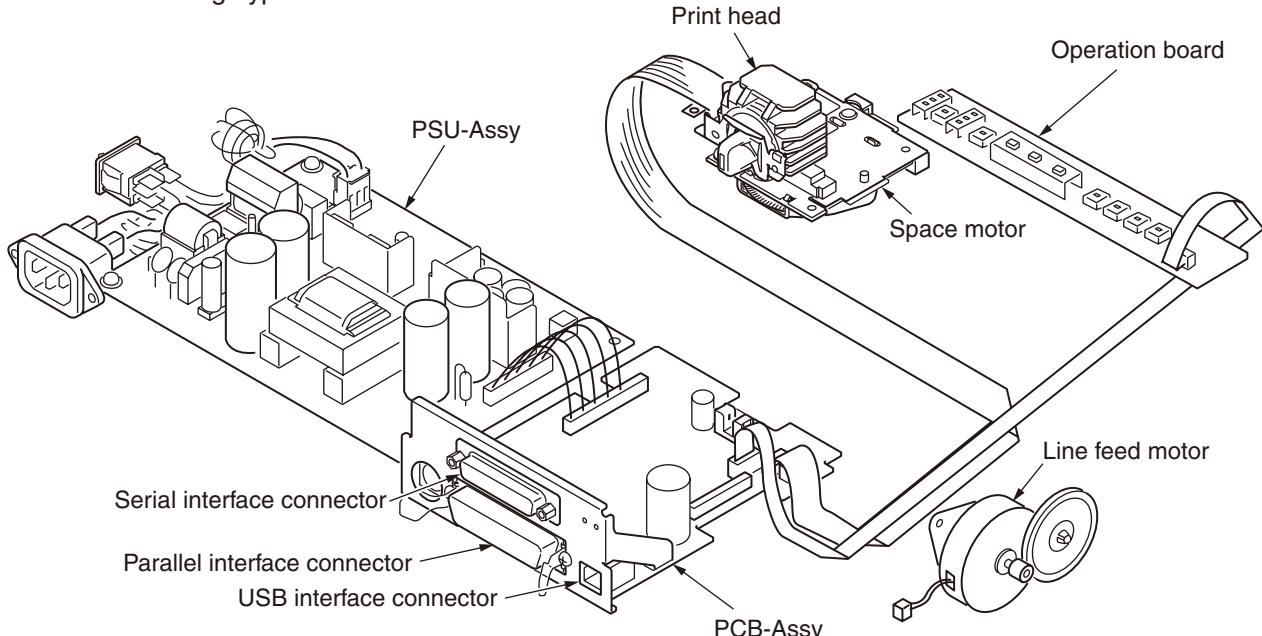


Figure1. Configuration of Electrical Section

2.1.2 SOC and the Peripheral Circuit

(1) SOC

SOC to be CPU and past LSI function, building SRAM into, and the outline of use is as follows.

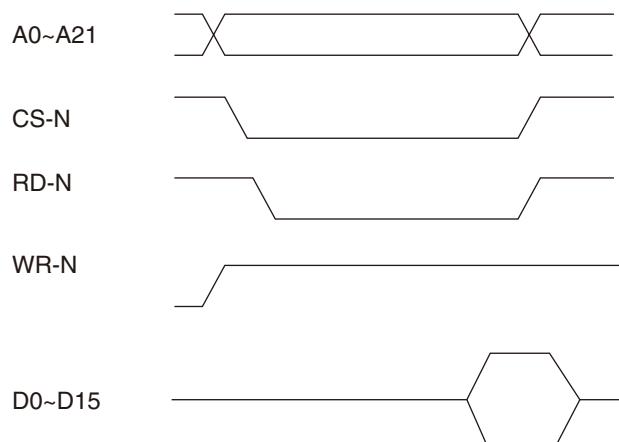
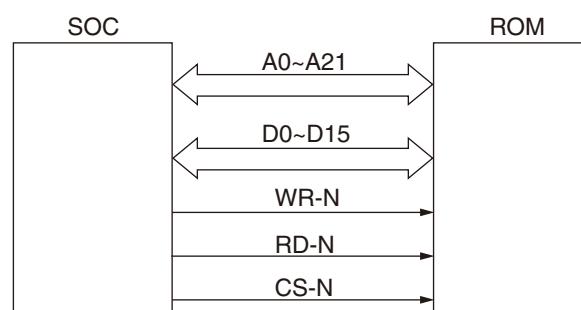
- 3.3V single power supply (1.2V in internal core voltage)
- Operation frequency 48MHz
- Built-in CPU core (ARM7TDMI)
- SRAM 4M bit
- With built-in USB controller
- With built-in UART function
- AD converter x 4ch DA converter x 2ch

OKI of other peripheral circuitry is original though CPU core uses ARM7TDMI.

(2) Program ROM (external FLASH ROM)

The program to make the printer work is stored in FLASH ROM as external ROM.

FLASH ROM that can be installed is 64Mbit(16bit x 4096k) or less. The access timing of the outline to FLASH ROM is shown in the following.



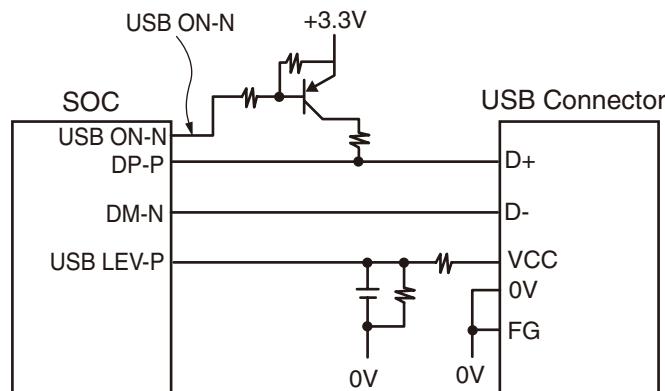
(3) RAM

In RAM, the memory capacity built into SOC is 256K x 16bit (4Mbit).

(4) USB Controller

The USB Controller detects and controls the USB interface.

The USB controller is built into SOC. The figure below shows the outline circuit.



2.1.3 Initialization

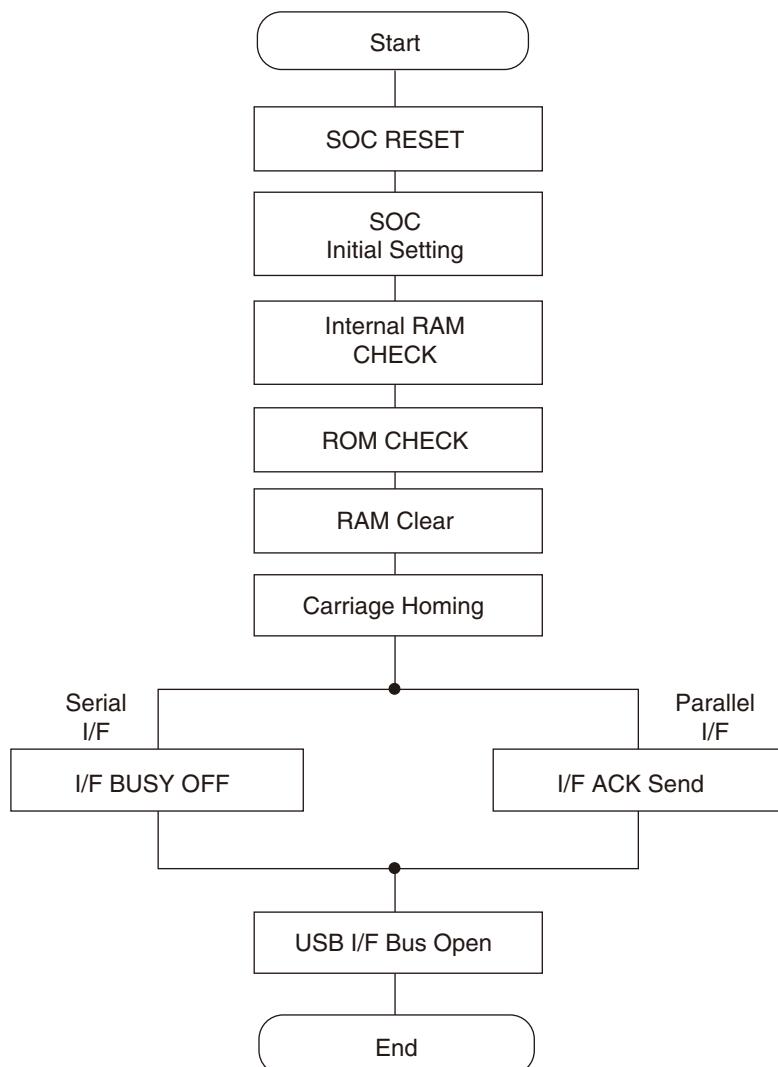
This printer is initialized when the power is turned on or when the I-PRIME-N signal is input from the host side via the parallel interface.

For the initialize operation, the RST-N signal is first output from the reset circuit to reset the SOC and Flash ROM. When resetting ends, the program starts. Reset operation by I-PRIME starts program to initialize, but does not reset the SOC.

The program here sets the mode of the SOC, checks the memories (ROMs and RAMs), then carries out carriage homing, and determines the LF motor phase.

Finally, the program establishes the interface signals (P-I/F: ACK-P signal sending, and S-I/F: BUSY-N signal off) and lights the SELECT lamp to inform the ready state for receiving to the host side and ends the initialize operation.

After USB I/F control I/O initialization and USB I/F bus opening.



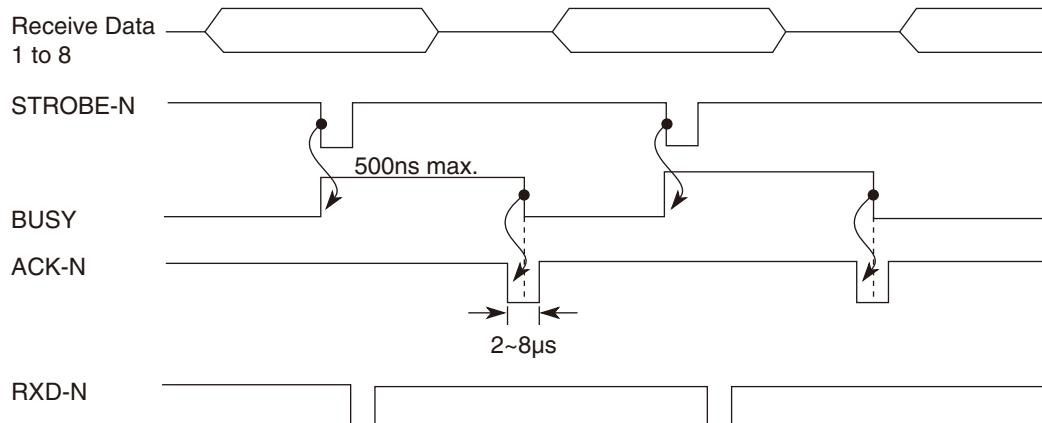
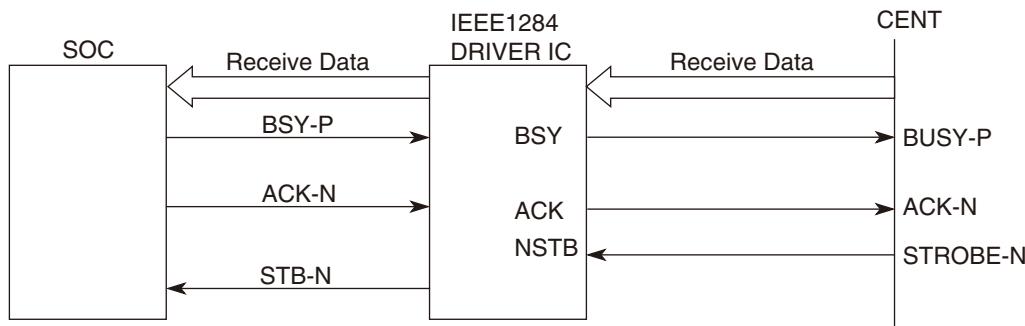
2.1.4 Interface Control

(1) Parallel Interface

The parallel data input from the host to the interfaced SOC is latched to its internal register at the falling edge of the STROBE-N signal.

At the same time, the SOC sets the BUSY signal to the high level to inform the host that the data is being processed, and outputs the RXD signal to inform the SOC of data reception. The data is read upon receiving the RD-N signal from the SOC.

When the data processing ends, the BUSY signal is set to off and the ACK-N signal is sent to request the next data. When reception is impossible because the buffer is full, the BUSY signal is sent to request stopping of data transmission.



* The STROBE-based timing for the BUSY signal is adjustable from the Maintenance menu.

ACK signal timing and BUSY signal timing can be adjusted from the Maintenance menu.

(2) Universal Serial Bus (USB)

Universal Serial Bus Specification Revision 2.0 (Full speed) compliance.

1) Connector

- Printer Side : "B" Receptacle (Upstream Input to the USB Device)
- Cable Side : Series "B" Plug

2) Cable

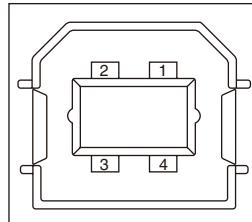
- Cable Length : Approx 1.8m (A cable must be met USB Spec Rev 1.1 for normal operation)

Note: Cable is not supplied.

3) Table of USB I / F signals

Contact Number	Signal Name	Typical Wiring Assignment
1	Vbus	Red
2	D -	White
3	D +	Green
4	GND	Black
Shell	Shield	Drain Wire

4) Connector pin arrangement



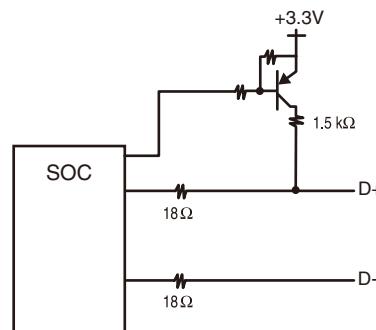
5) Mode & Class of Device

- Full - speed Driver
- Self - powered Device

6) Data Signaling Rate

- Full - speed function - $12\text{Mb/s} \pm 0.25\% (2500\text{ppm})$

7) Interface circuit



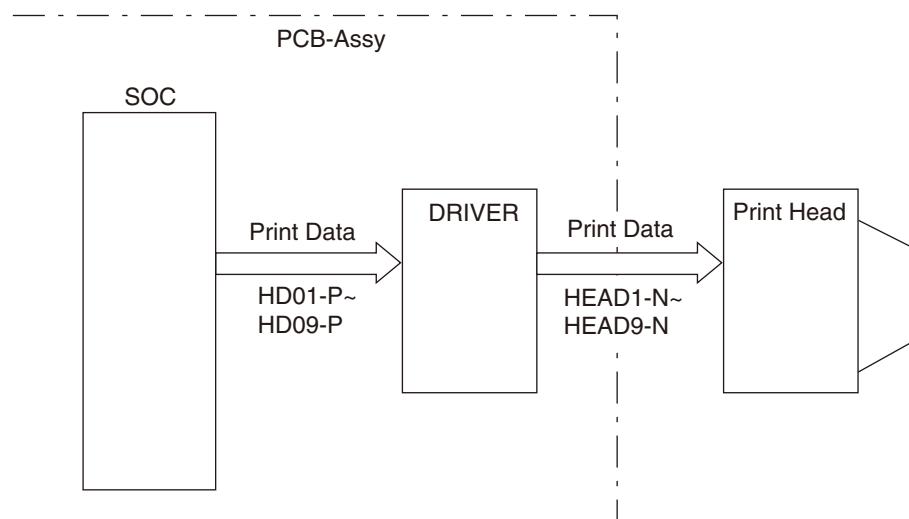
8) Signal Level

- Input / Output Level

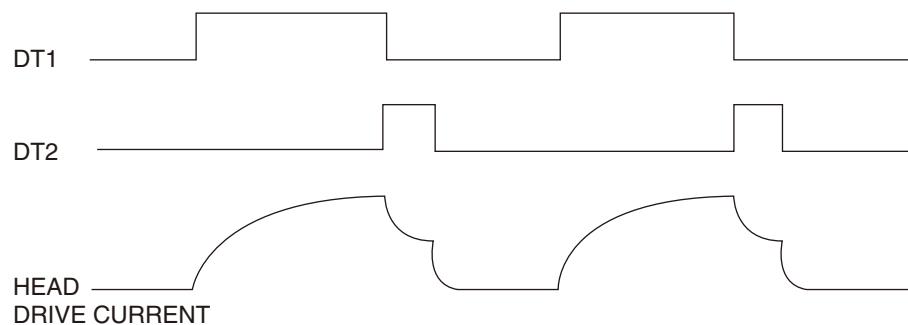
Input Levels:				
High (driven)	V_{IH}	2.0		V
High (floating)	V_{HZ}	2.7	3.6	V
Low	V_{IL}		0.8	V
Output Levels:				
Low	OL	0.0	0.3	V
High (driven)	OH	2.8	3.6	V
Output Signal Crossover Voltage	V_{CRS}	1.3	2.0	V

2.1.5 Print Control

Print data is transmitted as parallel data (HD01~HD09) from SOC to print head. SOC generates print timing and drive time.



HEAD DRIVE TIMING CHART

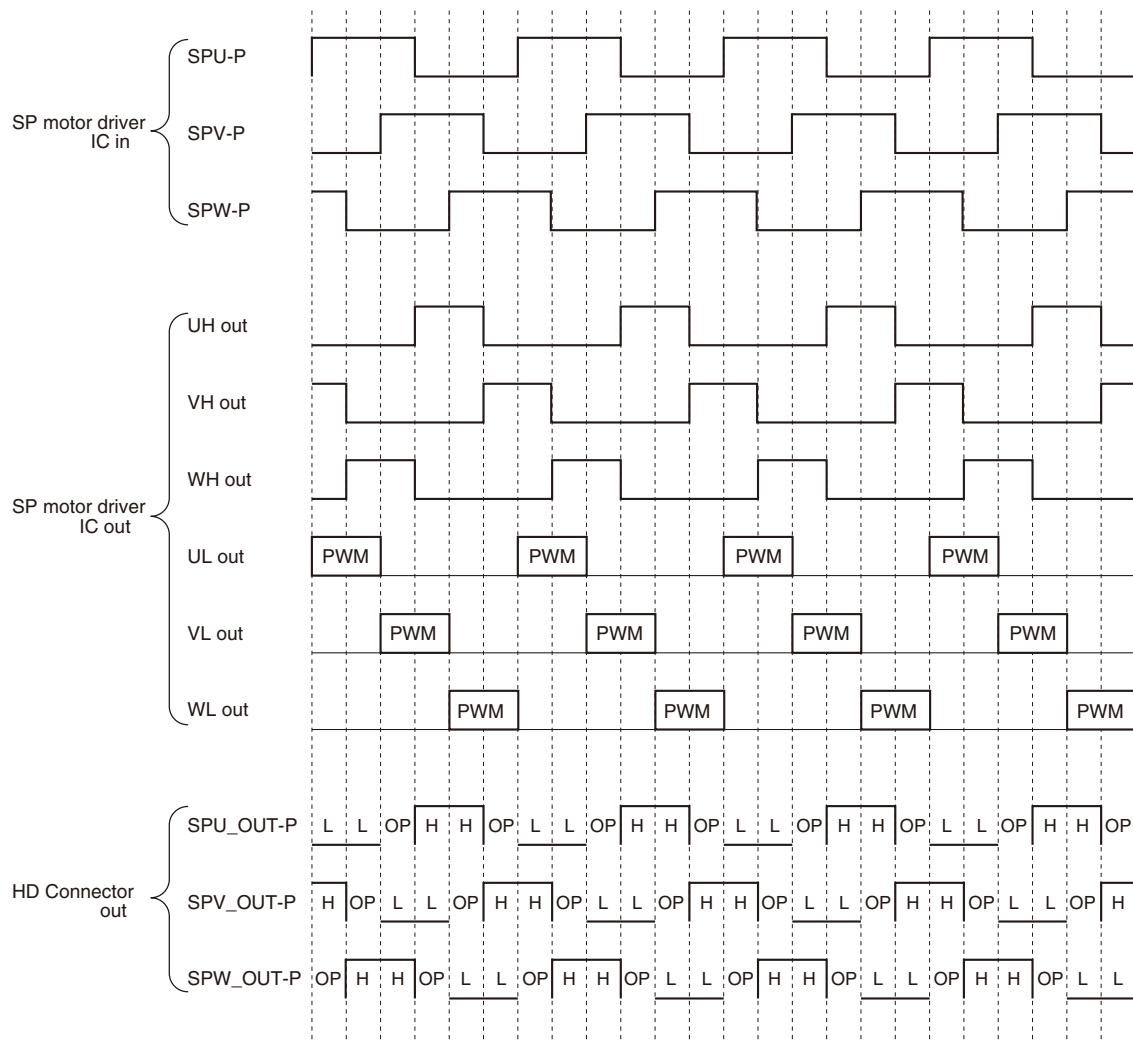


2.1.6 SP Motor Control

(1) Space motor control

The SP motor driver drives the three-phase brushless motor based on the phase signal (SPU-P, SPV-P and SPW-P) and the speed instruction data from the SOC. The SOC can identify the current speed of the space motor by measuring through the pulse length of the output (ϕA , ϕB) of the slit encoder included in the space motor.

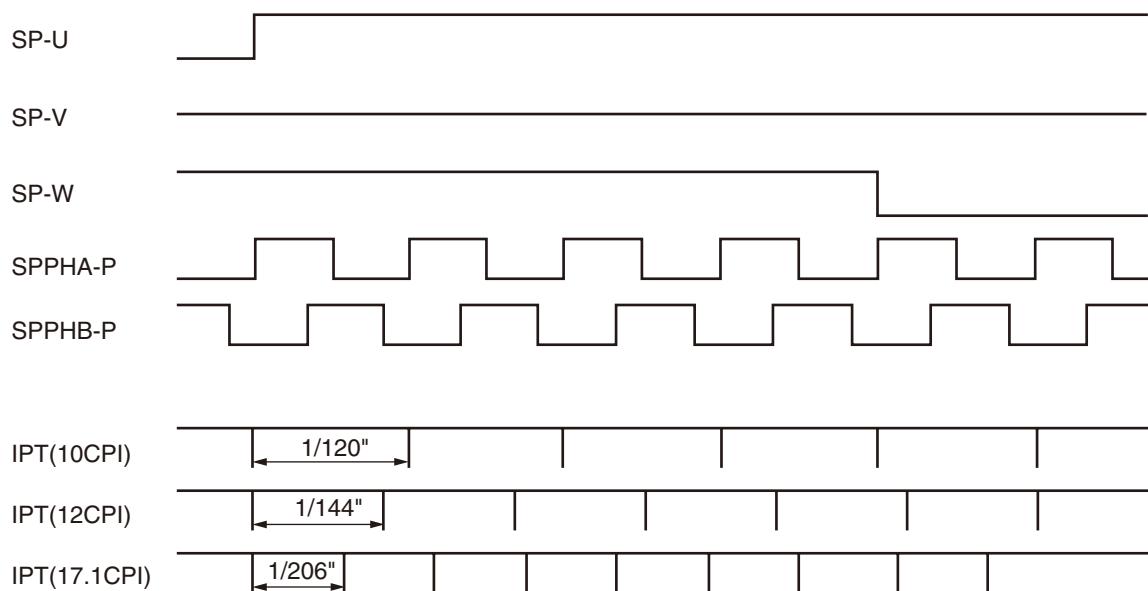
By comparing the target speed for each print mode with the actual current speed to change the speed instruction data, the motor speed is accelerated or decelerated to maintain the specified speed for each print mode.



(2) Encoder disk

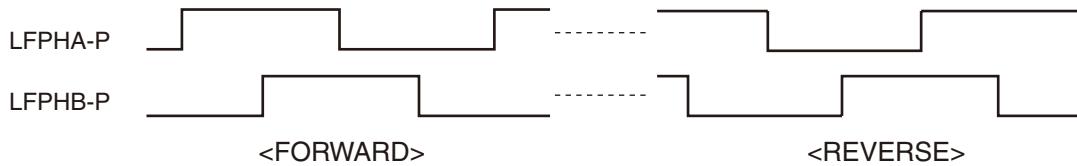
In the operation of the spacing motor, the SPPHA-P and SPPHB-P signals are generated when the encoder disk interrupts the photo sensor.

The SOC divides these edge pulse signals in accordance with the print pitch, and sends the IPT signal to provide dot-on timing and carriage position detection timing.



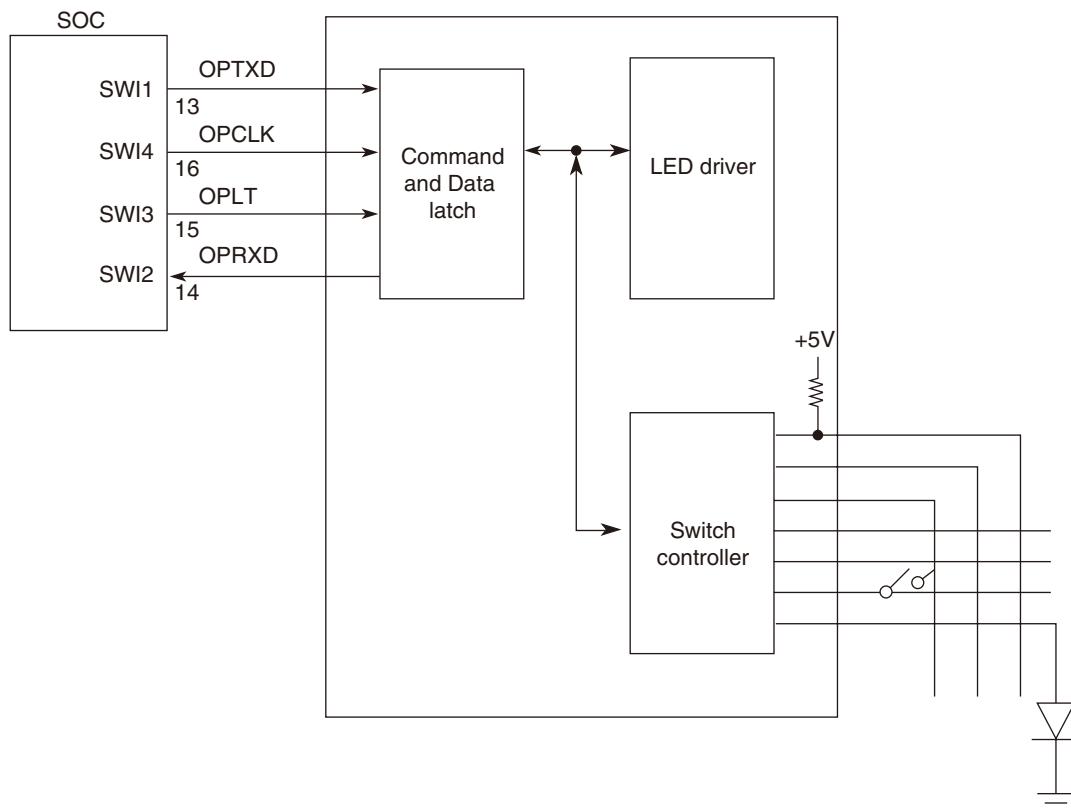
2.1.7 Line Feed Circuit

The SoC sends LFPHA-P and LFPHB-P signals to the LF driver (LFDV). Upon receiving these signals, the LF driver (LFDV) rotates the motor by bipolar constant current drive.



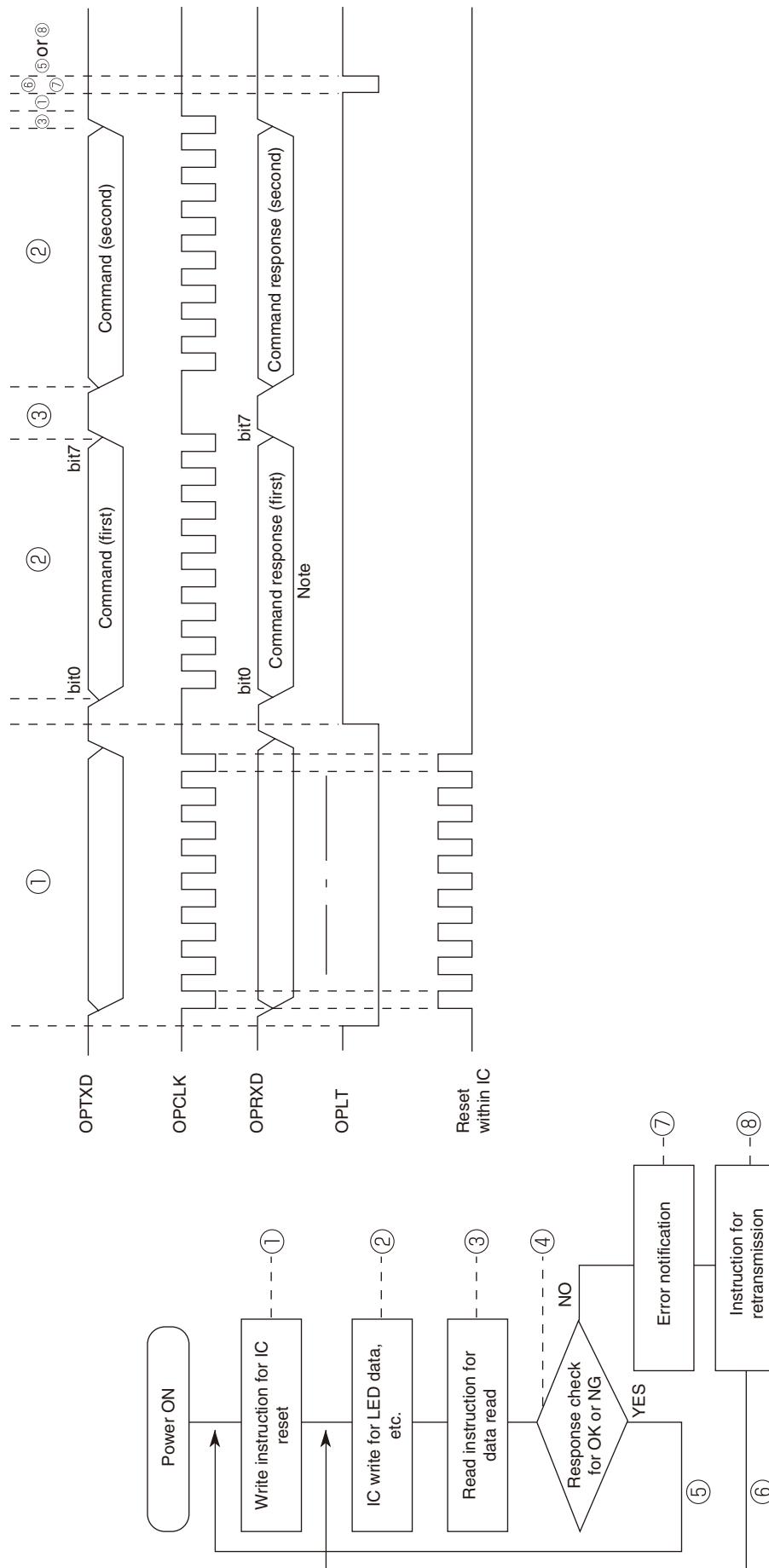
2.1.8 Operation Panel

The clock synchronization OPCLK of SOC is used to input the switch data and output the LED data through the operation panel control IC.



A 2-byte (15 bits + 1 even parity bit) command (OPTXD) is transmitted to the Operation Panel Control IC in synchronization with the OPCLK signal. The Operation panel control IC decodes this command and when it is found to be legal, returns a 2-byte command response back to the SOC which includes data on Switch information, LED status, receive command ACK/NAK and 1 odd parity bit.

Any transmission errors found cause the command to be reissued after the transmission of the OPLT signal.



Note: From the illustration above, you can see that the command and the command response are output at the same time. This is because the bit 0 to bit 3 of OPRXD are fixed so that the response can be returned before decoding the command.

2.1.9 Alarm Circuits

(1) Head drive time alarm circuit

This circuit monitors the drive time using the DT1ALM1-N signal interlocked with the overdrive signal of each drive circuit.

If the drive time of any drive circuit exceeds the specified time, the drive fault alarm circuit sends an ALM-P signal to Dropper-Type: Commutator-Board and Power Supply Unit or Switching-Type: PSU-Assy.

Switching-Type:

This signal turns off +40V and +5V output. This state is maintained after the power switch is turned off until the power supply resumes about 30 seconds later. Until the cause of the output of the ALM-P signal is removed, even if the power supply is resumed this function operates so that no +40V and +5V output occurs.

Dropper-Type:

The SCR circuit in the Commutator-Board is turned on. This short-circuits the secondary coil (40 V) of the transformer, resulting in an overcurrent in the primary coil, and blows the AC fuse.

(2) Head overheat alarm circuit

In order to protect the head coils, this circuit monitors the head temperature using the thermistor built into the print head.

If printing is performed continuously for an extended period, the print head gets hot. When the head temperature reaches a certain value (approximately 100 degrees C), a head overheat alarm is detected.

When this alarm is detected, printing stops temporarily to wait for the head to cool. When the head temperature drops below the alarm detection temperature, printing resumes.

Alarm detection is performed as follows:

The resistance of the thermistor decreases as the temperature in the print head rises, so the signal voltage level of HDTEMP_UP-N drops. Monitoring by the SoC detects the head overheat alarm.

(3) Space motor drive alarm circuit

This circuit monitors the drive time and drive current using the SPMALM1-P or SPMALM2-P and SP_OVER_C-P signals interlocked with the overdrive signal of FET of Phase U, V and W.

If the drive time of any drive circuit exceeds the specified time, or if the drive current more than the specified current, the drive fault alarm circuit sends an ALM-P signal to Dropper-Type: Commutator-Board and Power Supply Unit or Switching-Type: PSU-Assy.

Switching-Type:

This signal turns off +40V and +5V output. This state is maintained after the power switch is turned off until the power supply resumes about 30 seconds later. Until the cause of the output of the ALM-P signal is removed, even if the power supply is resumed this function operates so that no +40V and +5V output occurs.

Dropper-Type:

The SCR circuit in the Commutator-Board is turned on. This short-circuits the secondary coil (40 V) of the transformer, resulting in an overcurrent in the primary coil, and blows the AC fuse.

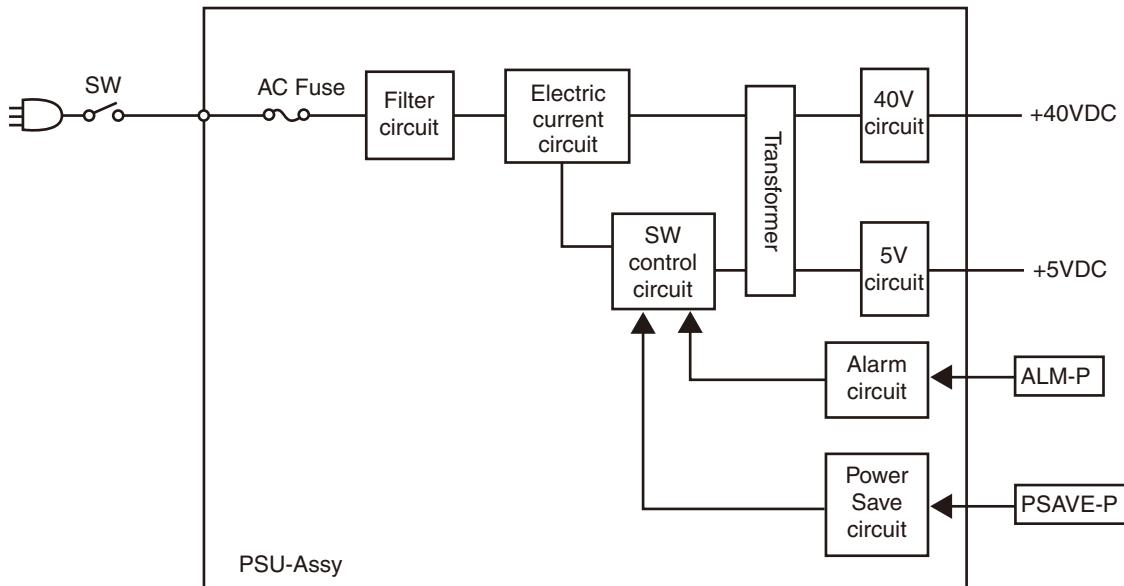
2.1.10 Paper End Detection Circuit

When the paper runs out, The photosensor (PE) on the PCB-Assy turns on, and as a result, the PAPEREND-P signal goes to +5VDC. This signal is fed to the SoC, stopping the printing operation and lighting the ALARM indicator.

2.1.11 Power Supply Circuit

(1) Switching-Type: PSU-Assy

This PSU-Assy is a switching power supply. This PSU-Assy supplies the +5VDC, +40VDC.



The uses of output voltages and signals are described below.

Voltage/signal	Use
+5V	Logic IC / LED drive / SENSOR drive
+40V	LF motor / SP motor drive / Printhead.

Various protective functions in the PSU-Assy:

1) +40V overcurrent detection function

When an overcurrent has been detected, this function suspends switching and cuts off all output.

This state in which all output is cut off is maintained.

Recovery takes place when the power supply is resumed about 30 seconds after turning off the power switch.

Until the cause of the overcurrent is removed, even if the power supply is resumed this function operates so that no +40V/+5V output occurs.

2) +5V output overcurrent detection function

When an overcurrent has been detected, this function lowers the voltage for this output only.

Voltage is restored when the cause of the overcurrent is removed.

3) +40V and +5V output overvoltage detection function

When voltage rises above the standard value of +40V or +5V, this function suspends switching and cuts off all output.

This state in which all output is cut off is maintained.

Recovery takes place when the power supply is resumed about 30 seconds after turning off the power switch.

Until the cause of the overvoltage is removed, even if the power supply is resumed this function operates so that no +40V/+5V output occurs.

4) Alarm function

When an ALM-P signal has been output from the PCB-Assy, this function suspends switching and cuts off all output.

This state is maintained after the power switch is turned off until the power supply resumes about 30 seconds later.

Until the cause of the output of the ALM-P signal is removed, even if the power supply is resumed this function operates so that no +40V/+5V output occurs.

5) Protection against incorrect AC voltage input

This PSU-Assy is a multi-input power supply. The power-supply voltage-setting pins can be used to set input at 100V or 200V. The power supply will not operate (i.e., no power will be supplied) when the power switch has been turned on with an incorrect setting for the AC input voltage used. In such a case, immediately turn off the power switch and change the settings to ones suited to the AC voltage used.

Operation during power saving

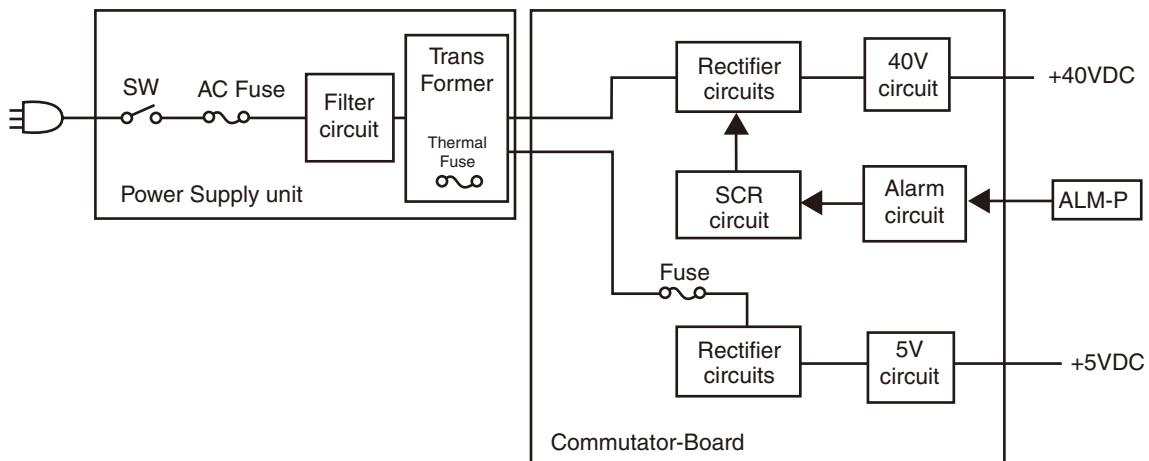
During power saving, a POWSAVE-P signal is output from the control unit to the PSU-Assy.

This signal decreases +40V voltage to approximately 20V to reduce power consumption.

When power saving is released, voltage is restored to +40V.

(2) Dropper-Type: Power supply unit and Commutator-Board

This Power supply unit and Commutator-Board is a Dropper power supply. This Power supply unit and Commutator-Board supplies the +5VDC, +40VDC.



The uses of output voltages and signals are described below.

Voltage/signal	Use
+5V	Logic IC / LED drive / SENSOR drive
+40V	LF motor / SP motor drive / Printhead.

Various protective functions in the Power supply unit and Commutator-Board:

1) +40V overcurrent detection function

The AC Fuse in the power supply unit blows out.

2) +5V output overcurrent detection function

The Fuse in the Commutator-Board blows out.

3) +40V and +5V output overvoltage detection function

When Voltage rises above the standard value of +40V or +5V, The SCR circuit in the Commutator-Board is turned on.

This short-circuits the secondary coil (40 V) of the transformer, resulting in an over-current in the primary coil, and blows the AC fuse.

4) Alarm function

When an ALM-P signal has been output from the PCB-Assy, The SCR circuit in the Commutator-Board is turned on.

This short-circuits the secondary coil (40 V) of the transformer, resulting in an over-current in the primary coil, and blows the AC fuse.

5) Protection against incorrect AC voltage input

The AC Fuse in the power supply unit blows out.

2.2 Mechanical Operation

2.2.1 The Printhead Mechanism and Its Operation (see figure 3)

The print head is spring-loaded, utilizing a permanent magnet, and can be easily removed or installed. The print head is mounted on a carriage that runs parallel to the platen and is connected with the control circuit via the head board.

The print head consists of:

- (a) Wire guide
- (b) Print wires
- (c) Armature assembly
- (d) Yoke
- (e) Springs
- (f) Spacer
- (g) Magnet assembly
- (h) Thermistor
- (i) Printed-circuit board

(1) Print head operation

When the print head is in the non-printing state, each armature is attracted by the permanent magnet, and the springs holding the armatures are compressed by the thickness of the spacer. The print wires, which are fastened to the individual armatures, are therefore held retracted within the wire guide.

When signals corresponding to a character to be printed are detected by the control circuit, currents flow through the corresponding coils to nullify the magnetic flux generated by the permanent magnet between the armatures corresponding to those coils and the permanent magnet pole. As a result, those armatures are driven toward the platen by the force of the armature springs, and the print wires fastened to those armatures eject from the tip of the wire guide and strike the paper through the ribbon to print dots on the paper.

After the character is printed, the magnetic flux of the permanent magnet attracts the armatures again so that the print wires retract into the wire guide.

The print head has a built-in thermistor to prevent the coils from overheating and burning due to continuous bi-directional printing over a long period. If the coil temperature exceeds the limit (approximately 100 degrees C), the control circuit detects the thermistor signal and stops the printing operation until the coil temperature drops below the limit.

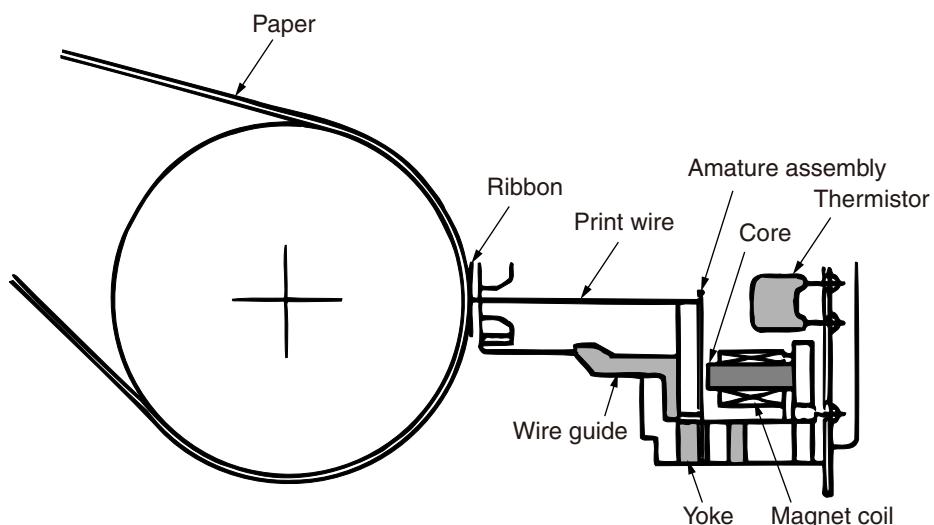


Figure 3

2.2.2 Spacing Mechanism and Operation (see figure 4)

The spacing operation is performed by driving the carriage frame, which is guided by carriage shaft mounted parallel to the platen, with the DC motor mounted on the bottom of the carriage frame.

The space mechanism consists of:

- (a) DC motor with motor gear
- (b) Carriage frame (including stator yoke and motor board)
- (c) Carriage shaft
- (d) Space rack
- (e) Slit sensor
- (f) Slit disk

(1) Spacing operation

The carriage, with the print head and space motor mounted on it, moves parallel to the platen along the carriage shaft. As the space motor rotates counterclockwise, the motor gear is driven rightward along the space rack, and as a result, the carriage is also driven rightward.

The spacing mechanism is so designed that the carriage frame moves 0.8 inch (20.56 mm) when the space motor rotates once.

The motor also rotates the slit disk, and the slit passes through the slit sensor. The position of the carriage frame can be obtained by counting the number of slits detected by the slit sensor.

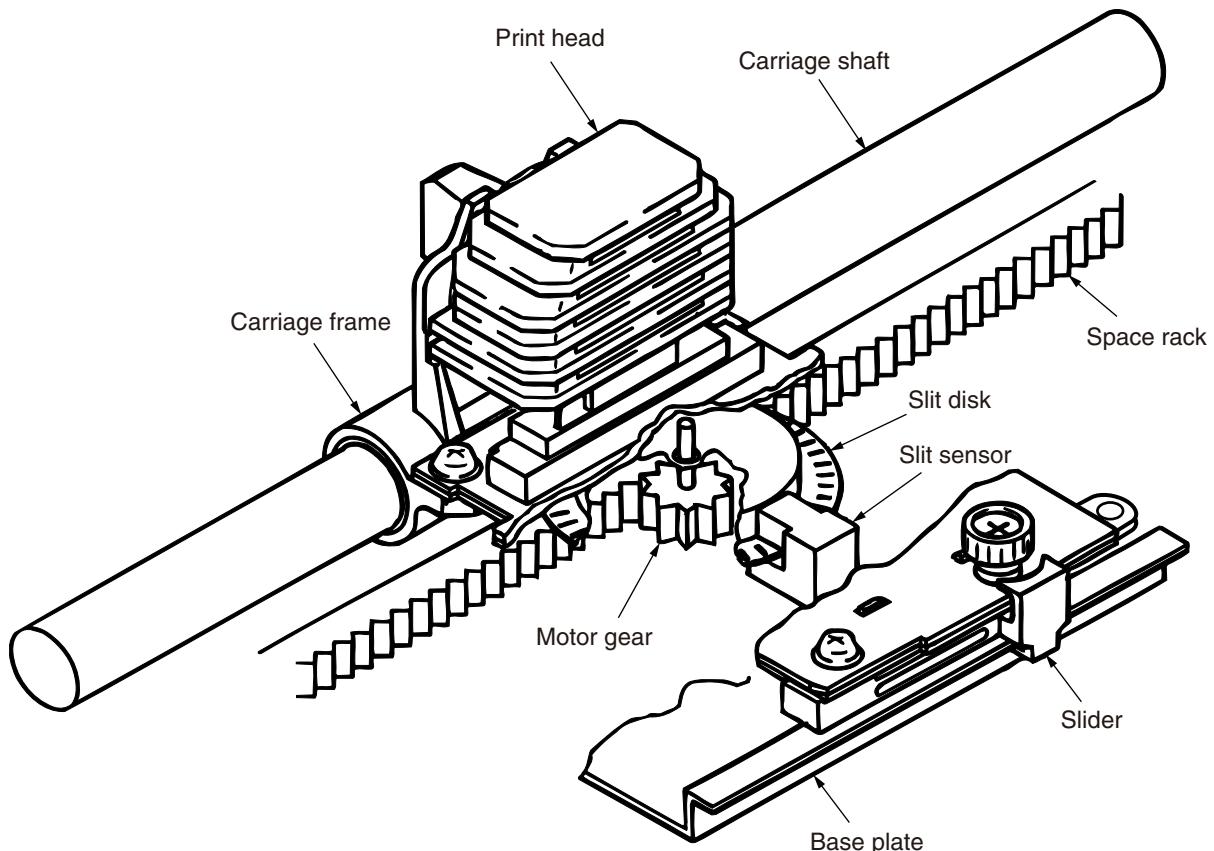


Figure 4

2.2.3 Head-Gap Adjusting Mechanism (see figure 5)

The head-gap adjusting mechanism adjusts the gap between the platen and print head by changing the tilt angle of the carriage frame with the adjusting lever.

When the adjusting lever is operated, the adjusting screw, which is interlocked with the lever via a gear, rotates to change the tilt angle of the carriage frame around the carriage shaft.

The print head, mounted vertically opposite the adjusting screw on the carriage frame, moves toward or away from the platen with change in the carriage frame tilt angle.

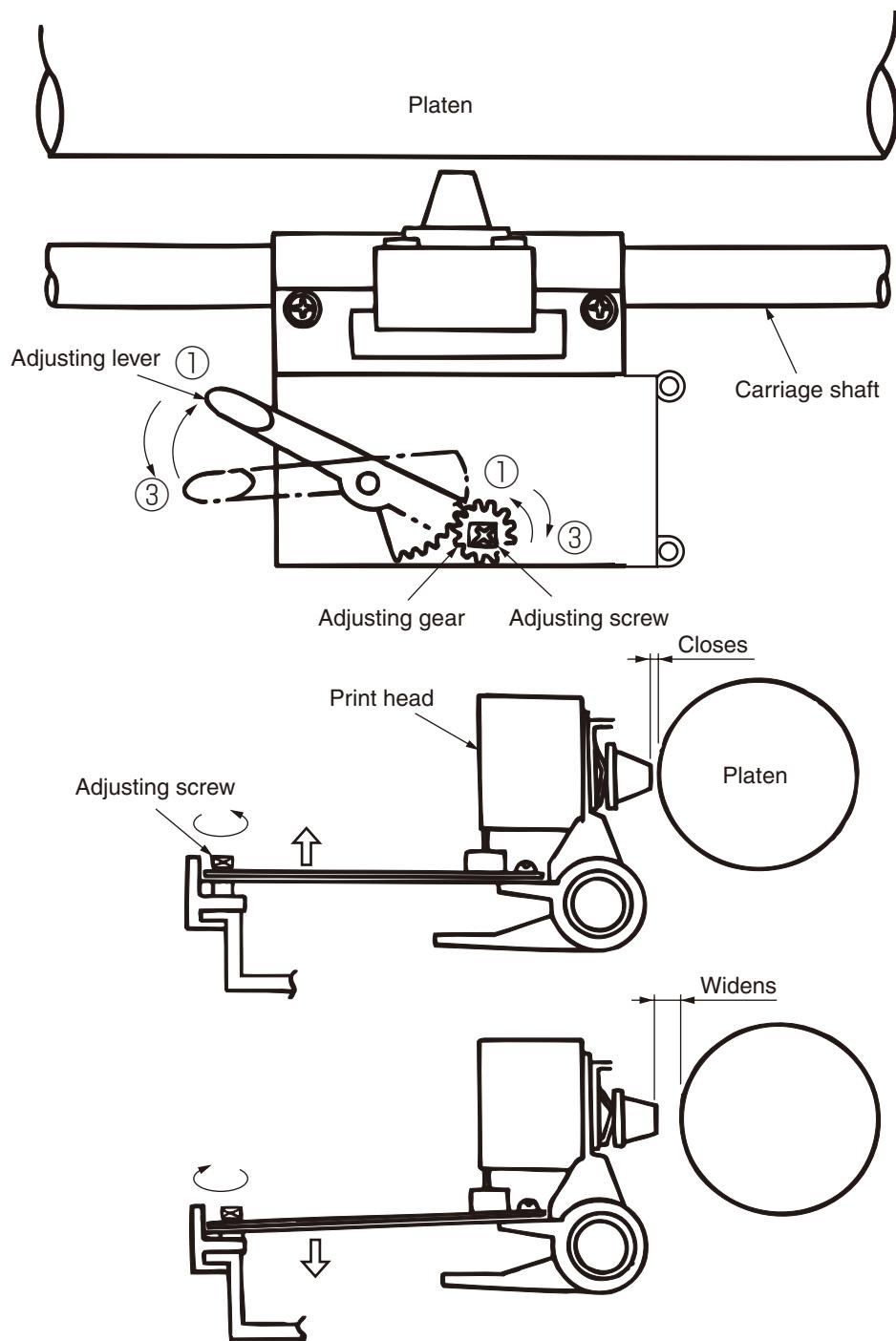


Figure 5

2.2.4 Ribbon Feed Mechanism and Operation (See figure 6)

The ribbon feed mechanism feeds the ribbon in synchronization with the spacing operation. The mechanism is driven by the space motor.

The ribbon feed mechanism consists of:

- (a) Ribbon feed gear assembly
- (b) Ribbon gear (space motor)
- (c) Ribbon cartridge

(1) Ribbon cartridge

A one-way-feed endless ribbon is used. Ink is replenished by the built-in ink tank in the ribbon cartridge so that clear printing is always assured.

(2) Ribbon feed operation

As the space motor rotates, the ribbon gear on the space motor shaft rotates to drive the drive gear in the ribbon cartridge via the ribbon feed gear assembly, thus feeding the ribbon.

In bi-directional printing, the ribbon gear rotational direction reverses every time the carriage movement reverses. In this case, the gears in the ribbon feed gear assembly switch the rotational direction so as to feed the ribbon in a fixed direction.

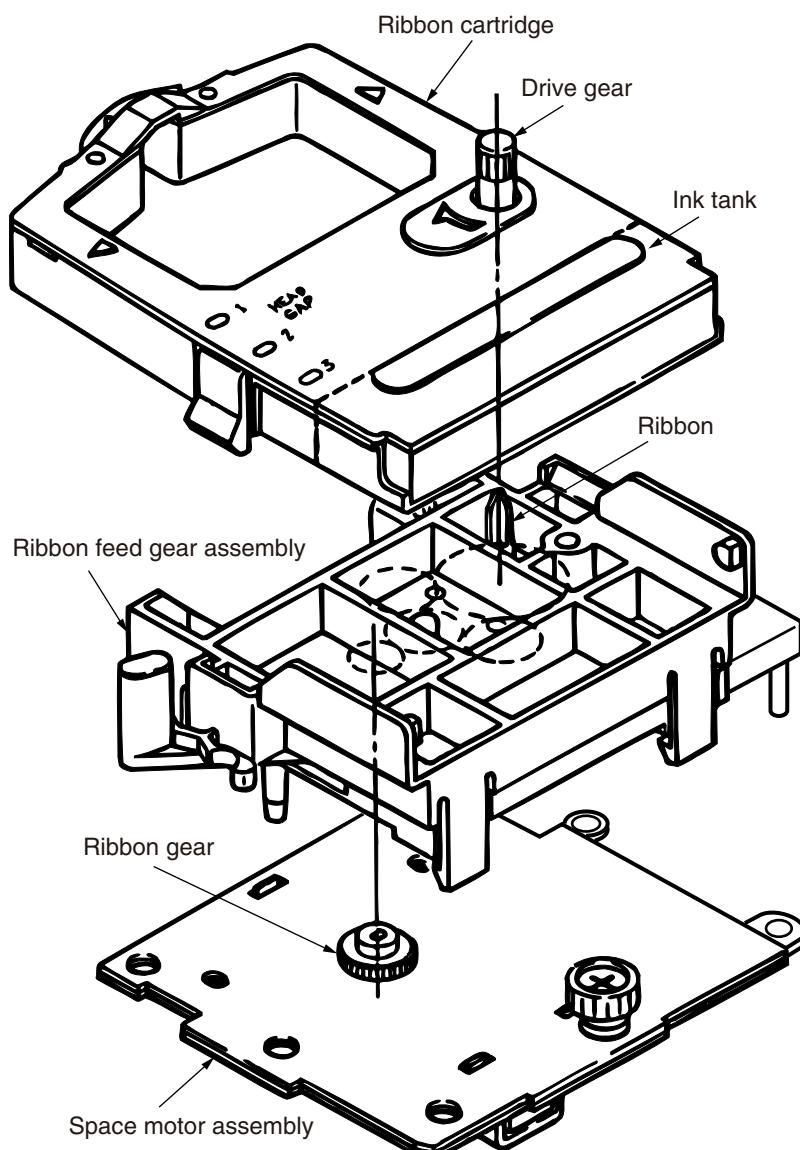


Figure 6

2.2.5 Paper Feed Mechanism and Operation

Paper feed is performed by rotating the platen and pin tractors, which are driven by the LF pulse motor.

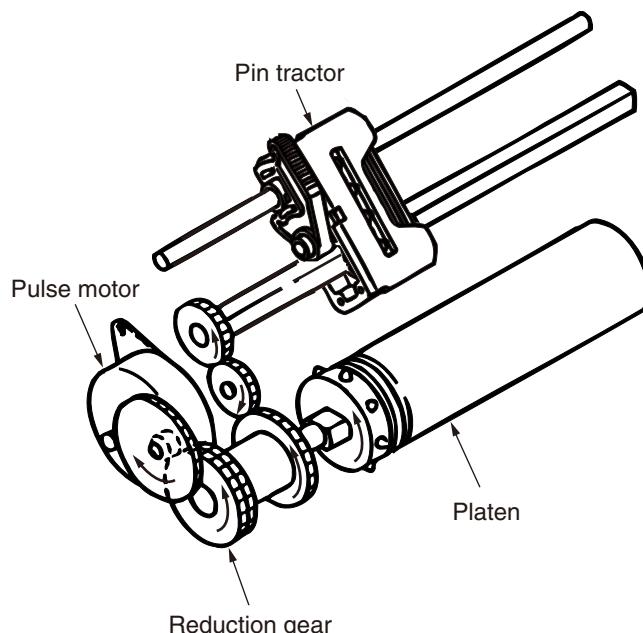
The paper feed mechanism consists of:

- (a) Pulse motor with gear
- (b) Reduction gear
- (c) Platen
- (d) Tractor feed unit
- (e) Pressure roller

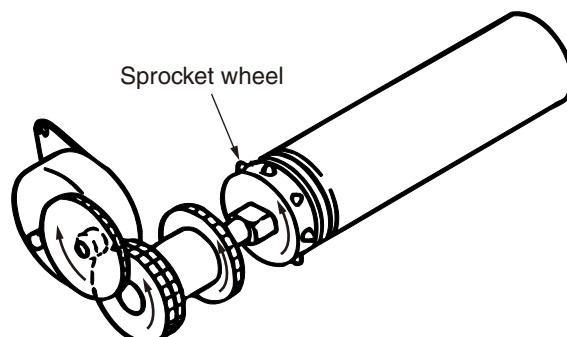
(1) Paper feed operation (see figure 7)

The paper feed pulse motor is mounted on the left side frame. Its rotation is transmitted to the platen through the reduction gear. Platen rotation is also transmitted through the idle gear to the tractor feed unit.

The paper feed mechanism is so designed that when the pulse motor rotates 48 steps (360 degrees), paper is fed 0.17 inch (4.32 mm).



Tractor feed (option)



Fixed pin feed

Figure 7

(2) Paper clamp mechanism (see figure 8)

When the release lever is set to open, the release link moves backward, and the front and rear release links rotate counterclockwise. At the same time, the interlocked release shaft also rotates counterclockwise so that a gap is made between the pressure rollers and platen, allowing insertion of paper.

When the release lever is set to close, the release link moves forward, and the front and rear release links rotate clockwise. At the same time, the interlocked release shaft also rotates clockwise so that the pressure rollers are pushed against the platen by the front and rear pressure levers, allowing paper to be fed.

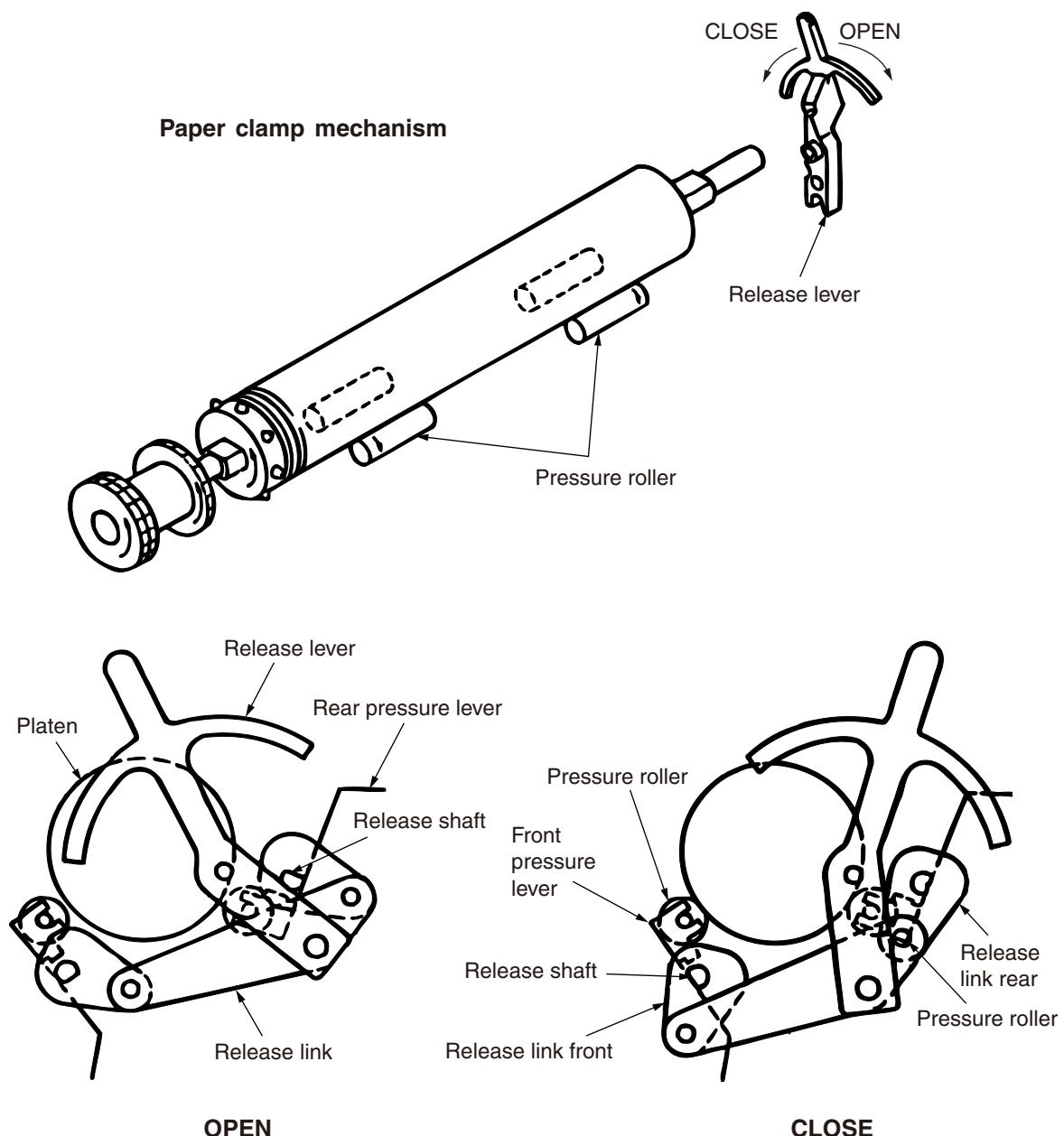


Figure 8

2.2.6 Paper -End Detection Mechanism (see figure 9)

(1) Rear paper feed

When paper is present in the printer, the paper prevents the near-end lever from falling into the groove of the paper-chute, and the paper-end sensor is on.

When the printer runs out of paper, the near-end lever falls into the groove of the paper-chute so that the rear part of the near-end lever turns off the paper-end sensor, and thus paper-end is detected. Paper-end is detected when the end of the remaining paper is approximately 1 inch (25.4 mm) from the printing position.

(2) Bottom paper feed

When paper is present in the printer, the paper prevents the bottom near-end lever from falling into the hole in the bottom paper guide. That is, the wedge on the bottom near-end lever pushes down the projection of the near-end lever, and the paper-end sensor is on.

When the printer runs out of paper, the tip of the bottom near-end lever falls into the hole in the bottom paper guide so that the rear part of the near-end lever turns off the paper-end sensor, and thus paper-end is detected. Paper-end is detected when

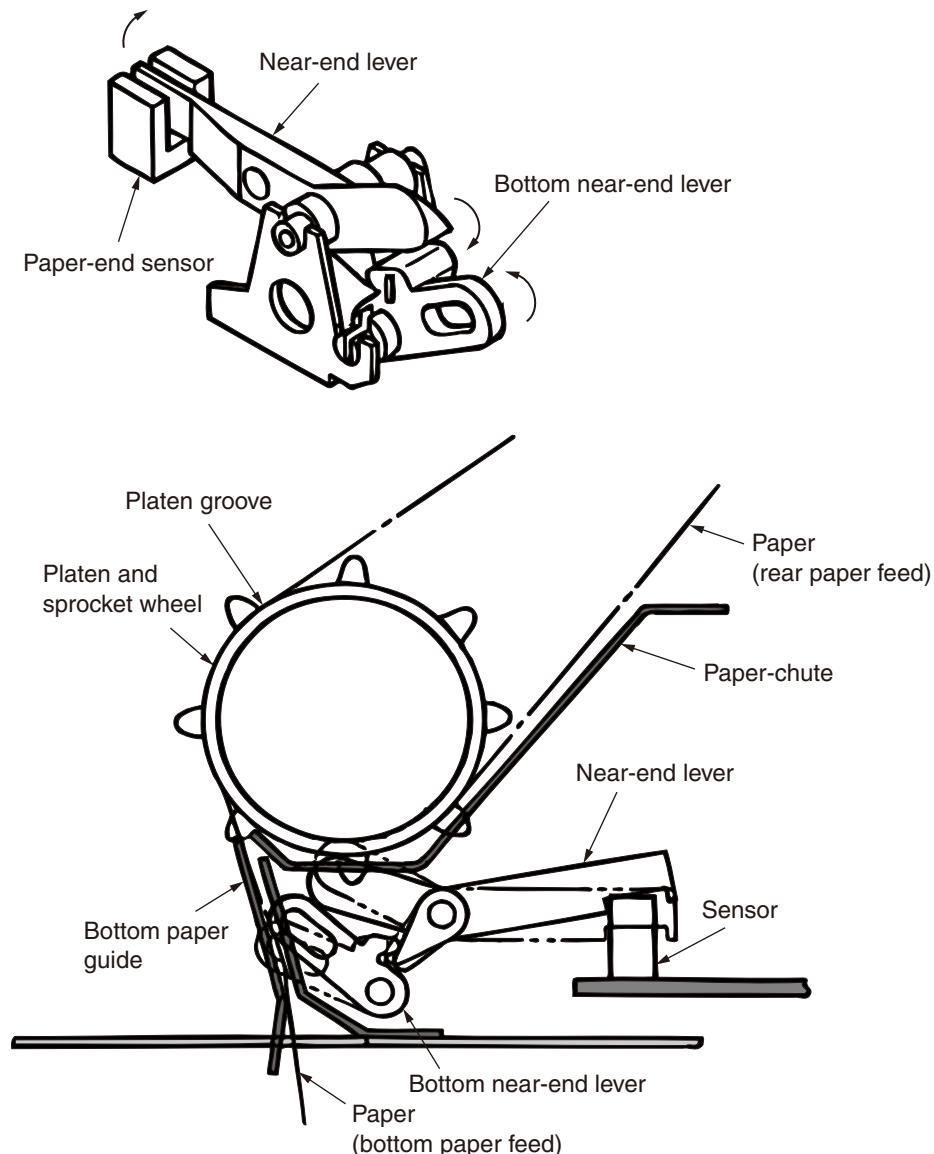


Figure 9

3. ASSEMBLY/DISASSEMBLY

3.1 Precaution for parts Replacement

- (1) Be sure to remove the AC cord and interface cable before disassembly or reassembly:
 - (a) Turn off the AC power switch, remove the AC input plug on the AC cord from the AC receptacle, then remove the AC cord from the inlet on the printer side.

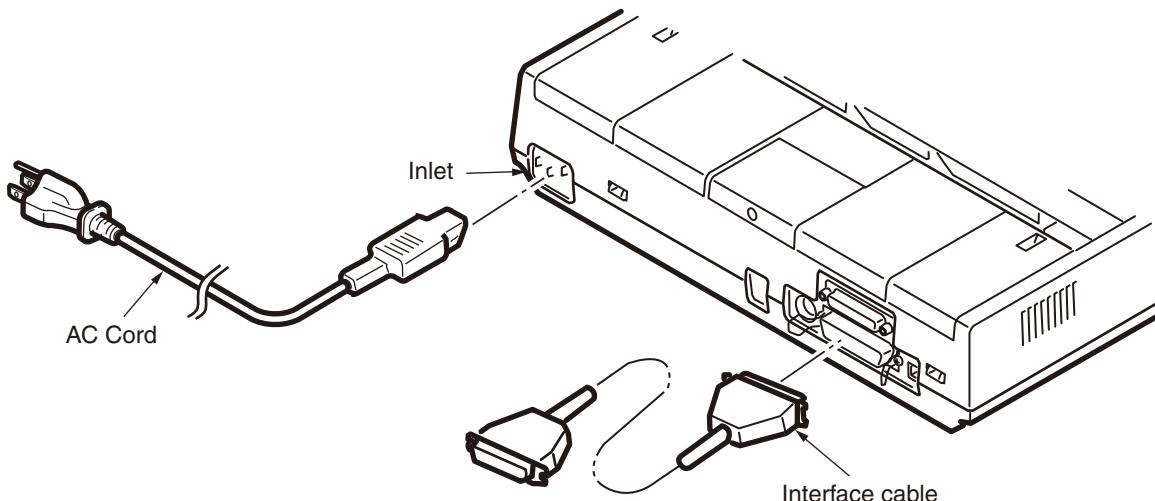
⚠ Warning	Risk of electric shock	
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There is a risk of electric shock during replacement of the power supply.

Use insulating gloves or avoid direct contact with any conducting part of the power supply, and caution should be exercised during replacement.

The capacitor may take one minute to complete discharge after the AC cord is unplugged. Also, there is a possibility that the capacitor doesn't discharge because of a breakage of the PCB, etc., so remember the possibility of electric shock to avoid electric shock.

- (b) To reconnect the AC cord, first connect it to the inlet on the printer side, then connect the AC input plug to the AC receptacle.



- (2) Do not disassemble the printer as long as it is in good operating condition.
- (3) Be careful not to remove parts unless necessary. Disassembly should be kept to minimum.
- (4) Use only the specified maintenance tools.
- (5) Disassemble the printer in the specified order. Otherwise, parts may be damaged.
- (6) During disassembly temporarily attach small parts, such as screws and collars, in their original places so as not to lose them.
- (7) ICs such as the microprocessor and RAM units are easily damaged by static electricity. Do not wear gloves that are apt to produce static electricity when handling printed-circuit boards.
- (8) Do not place the printed-circuit boards directly on the printer or the floor.

3.2 Maintenance Tools

The tools in table 3-1 are necessary for replacing printed-circuit boards and parts in the field. Different tools may be necessary for other maintenance procedure.

Table 3-1 Maintenance Tools

No.	Tool	Quantity	Purpose
1	Phillips screwdriver No.1-100	1	2- to 2.6-mm screws
2	Phillips screwdriver No.2-200	1	3- to 5-mm screws
3	Screwdriver No.3-100	1	
4	Cutters No.5H	1	
5	Round Pliers No.1	1	
6	Tension gauge	1	250g
7	Metal rod	1	for head gap adjustment
8	Volt-ohm-milliammeter	1	
9	Thickness gauge set	1	(1) for head gap adjustment (2) for adjusting gap between space rack and roller

3.3 Disassembly/Reassembly of Procedure

This section explains the assembly replacement procedures according to the following disassembly system.

[Parts Layout]

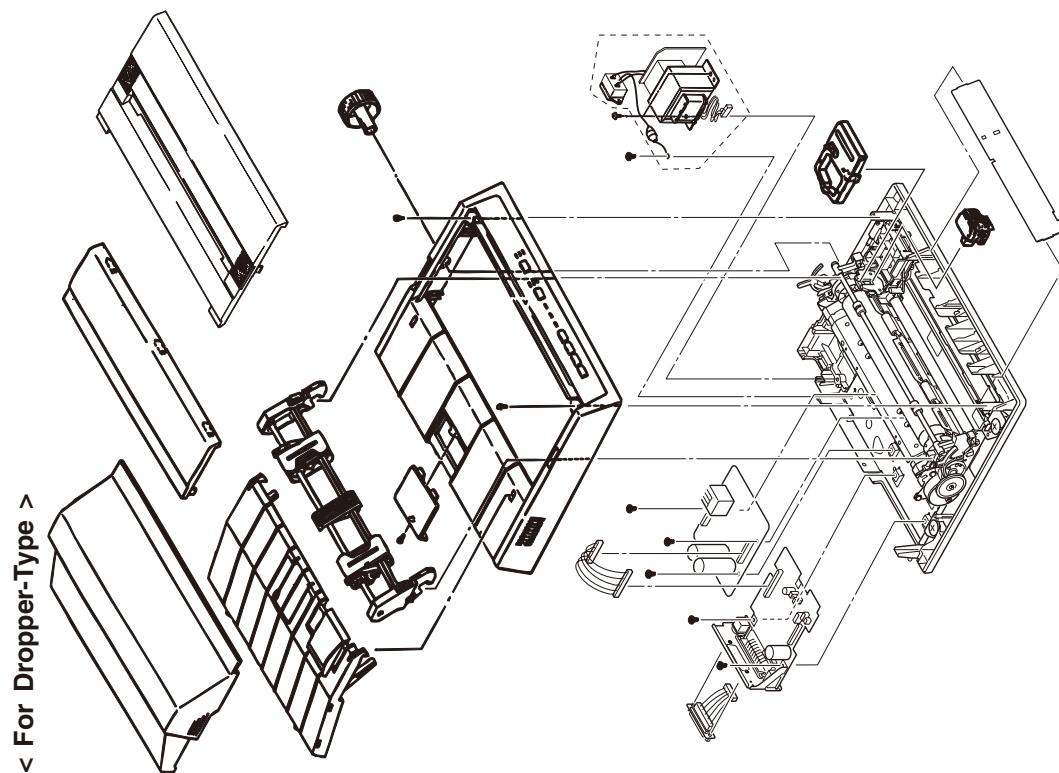
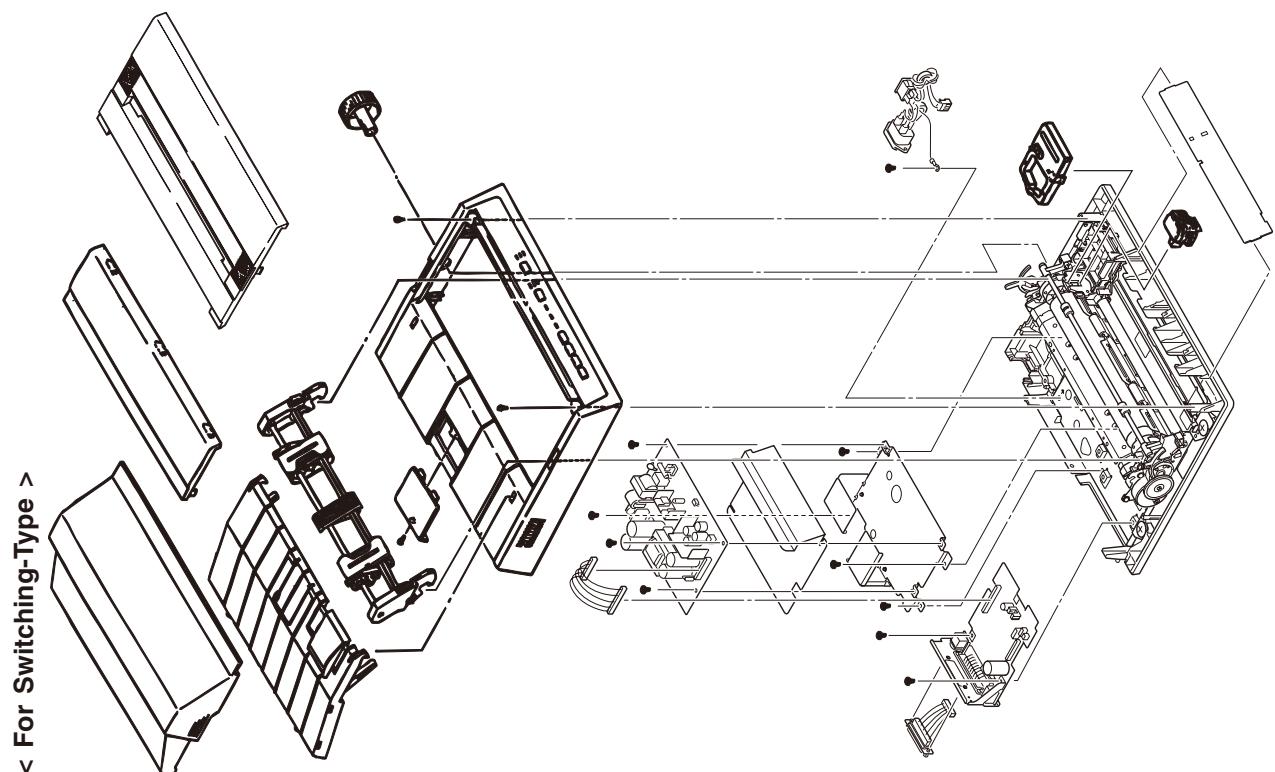
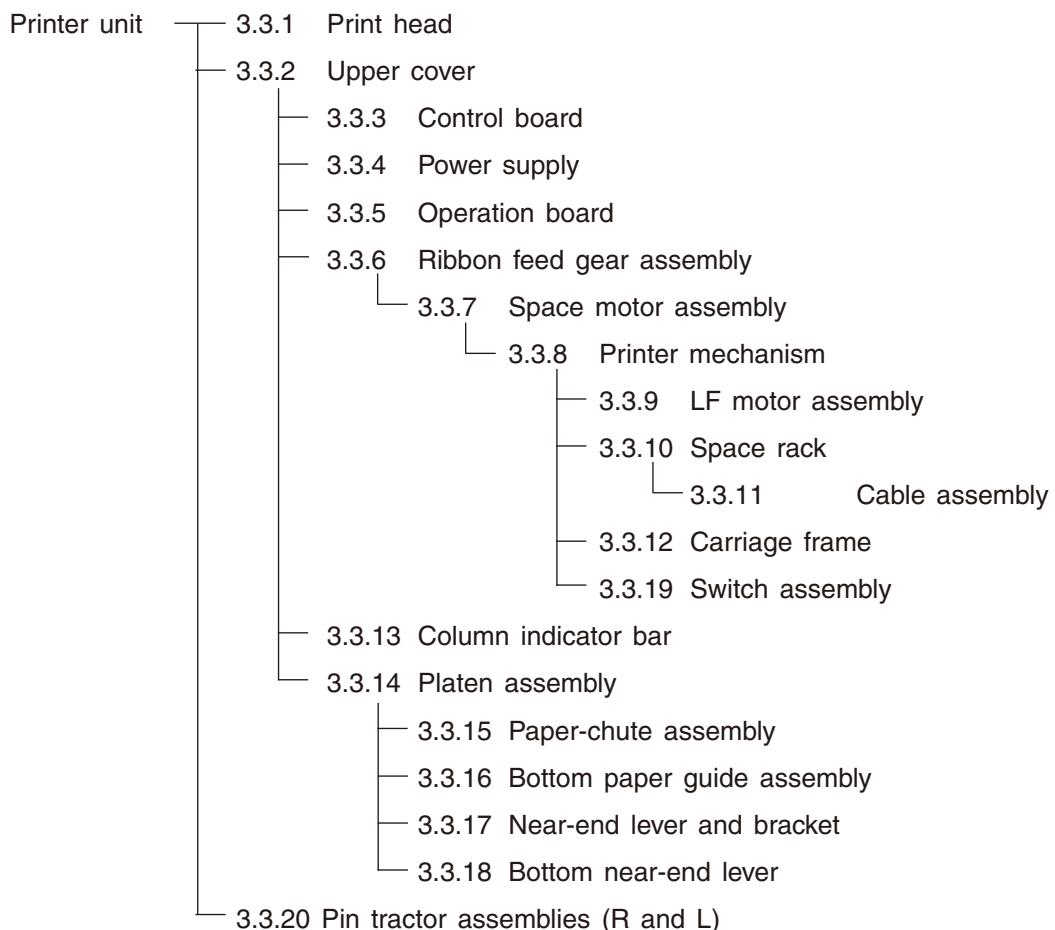


Figure 3-1

[How to Change Parts]

This section explains how to change parts and assemblies appearing in the disassembly diagram below.



3.3.1 Print Head

- (1) Turn OFF the AC POWER switch, and remove AC cable ① from the outlet.
- Caution:** Print head may be hot after printing.
- (2) Remove access cover ② by lifting the rear edge of the cover.
- (3) Remove ribbon cartridge ③ by firmly holding both sides Ⓐ and lifting.
- (4) Raise head clamp ④ and lift print head ⑤ straight up.
- (5) For reassembly, reverse the disassembly procedure.

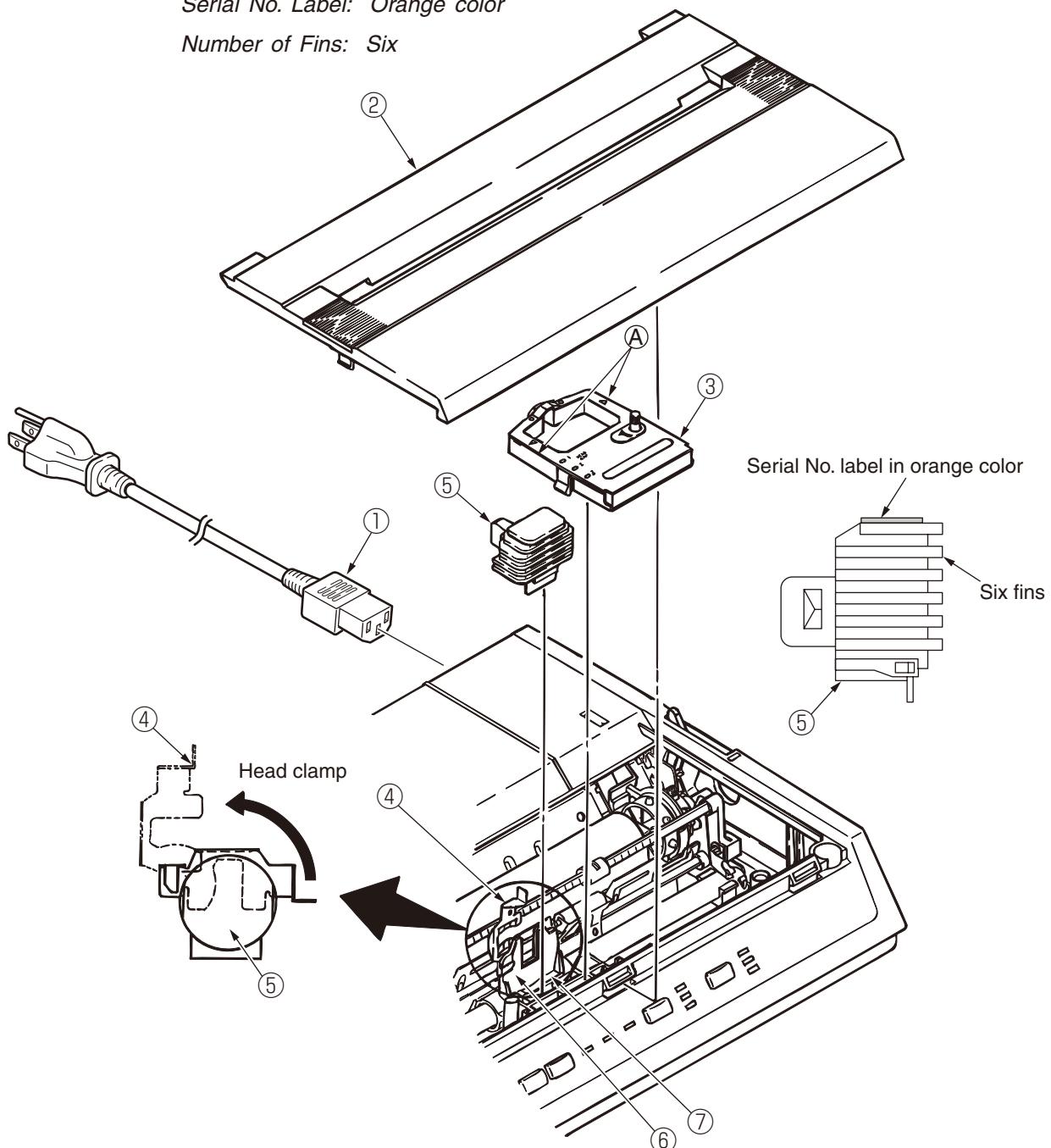
Note:

1. Insert the print head ⑤ in connector ⑥ while pressing it against the carriage frame ⑦.
2. When reinstalling the print head, observe the following of the print head are correct, and reassemble parts:

Part Number: 42666401

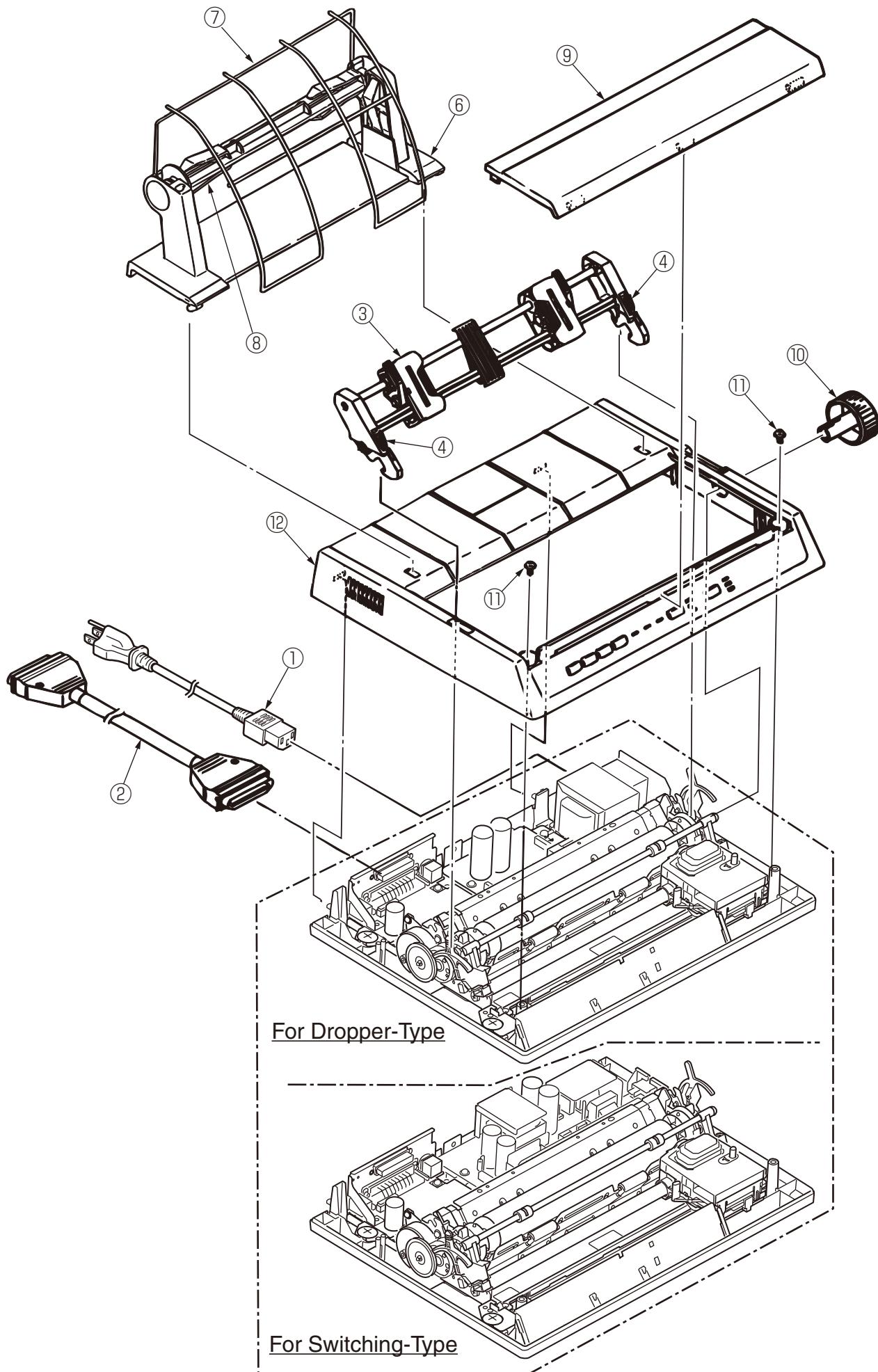
Serial No. Label: Orange color

Number of Fins: Six



3.3.2 Upper Cover

- (1) Turn OFF the AC POWER switch, remove AC cable ① from the outlet, remove interface cable ②, and remove paper.
- (2) Remove the acoustic cover and paper separator (if installed).
- (3) Remove the pin tractor assembly ③ by depressing the lock lever ④ and tilting it backward (if installed).
- (4) Open the sheet guide ⑦.
- (5) Remove roll paper shaft ⑧ by pulling upward, then remove roll paper stand ⑥ by tilting it forward (if roll paper stand is installed).
- (6) Remove access cover ⑨ by lifting the rear edge.
- (7) Pull out platen knob ⑩.
- (8) Remove two screws ⑪.
- (9) Remove upper cover ⑫ by lifting the front and pushing it backward.
- (10) For reassembly, reverse the disassembly procedure.

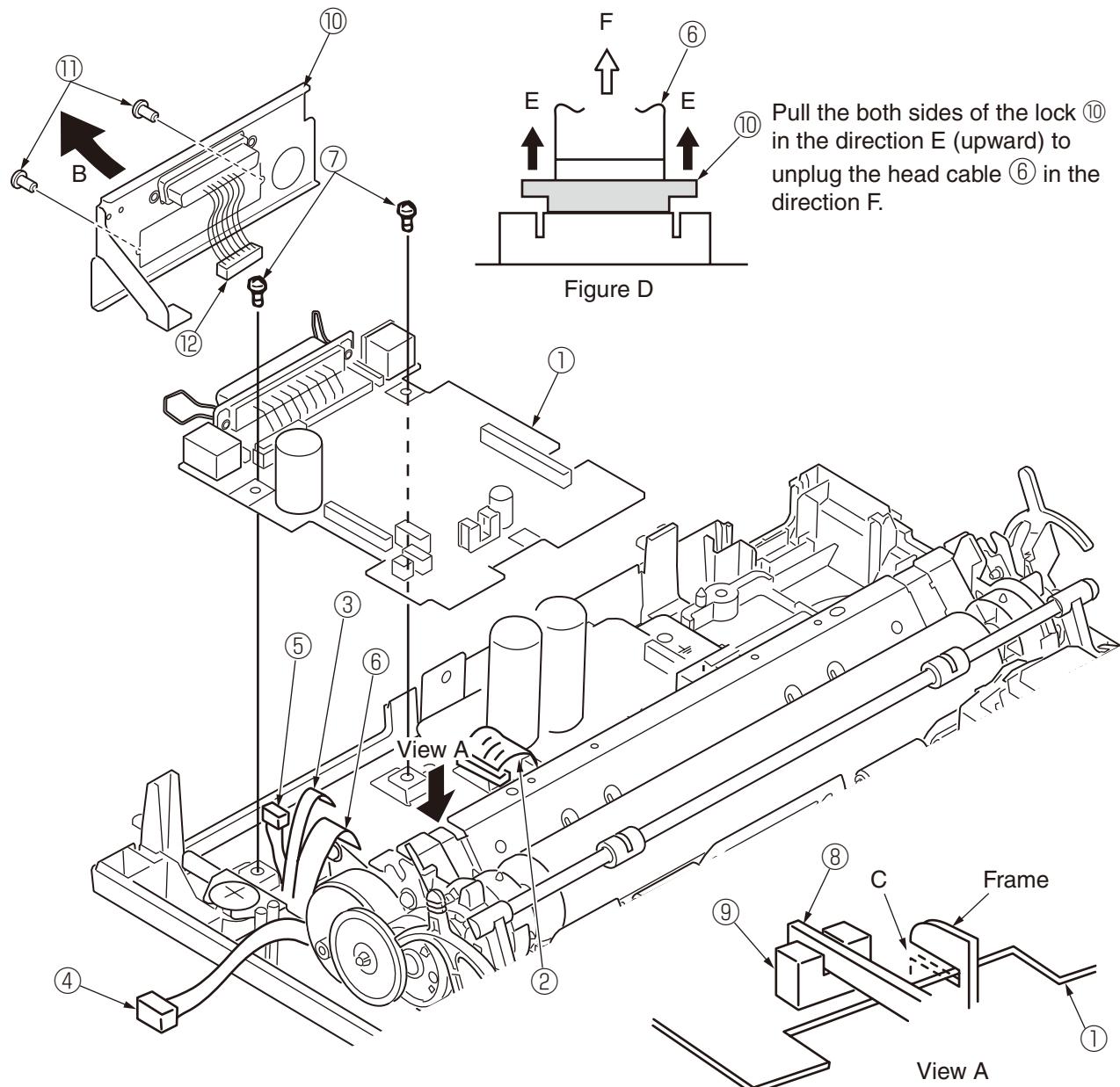


3.3.3 PCB-Assy

- (1) Remove the upper cover (see 3.3.2).
- (2) Unplug from the PCB-Assy ① the power cord ②, the operation panel cable ③, the LF motor cord ④ and the bail open switch cord ⑤.
- (3) Unplug the print head cable ⑥ according to figure D.
- (4) Remove the two screws ⑦.
- (5) Move the PCB-Assy ① in the direction of the arrow B (obliquely backward) and, removing the part C fitted into the frame ⑧, detach the board.
- (6) Remove the two screws ⑪.
- (7) If the RS cable ⑫ is mounted, Unplug from the PCB-Assy ① the RS cable ⑫.
- (8) Remove the I/F bracket ⑩ from the PCB-Assy ①.
- (9) For reassembly, reverse the disassembly procedure.

Notes: When attaching, make sure that paper near-end lever ⑧ is in the photosensor grove ⑨ on the PCB-Assy ①.

When mounting the maintenance board on the printer, mount the removed the I/F bracket ⑩, the RS cable ⑫ and the two screw ⑪ on the maintenance board.



3.3.4 Power supply

3.3.4.1 Power supply unit (Dropper-Type-only)

⚠ Warning

Risk of Electric Shock

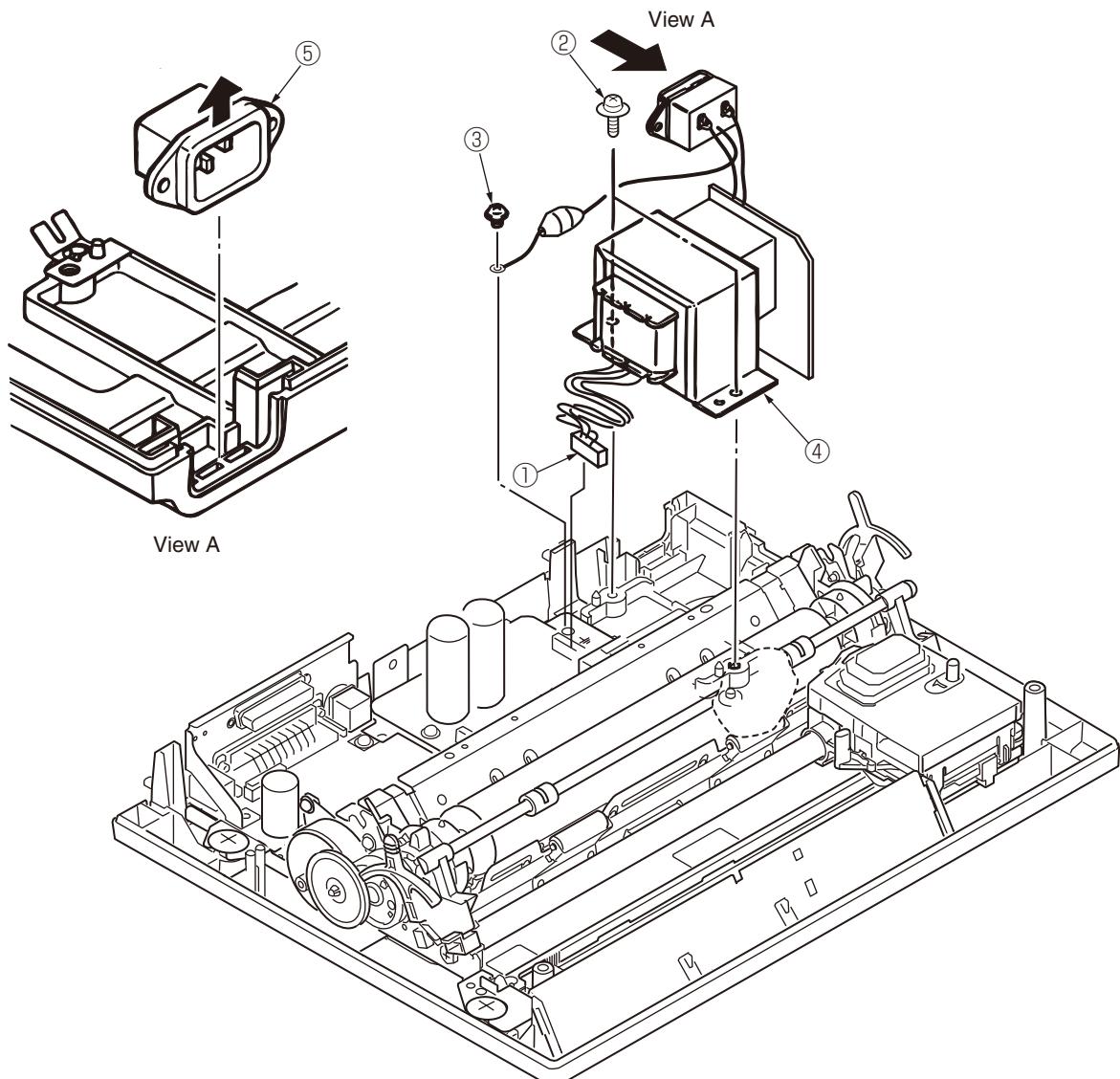


There is a risk of electric shock during replacement of the power supply.

Use insulating gloves or avoid direct contact with any conducting part of the power supply, and caution should be exercised during replacement.

The capacitor may take one minute to complete discharge after the AC cord is unplugged. Also, there is a possibility that the capacitor doesn't discharge because of a breakage of the PCB, etc., so remember the possibility of electric shock to avoid electric shock.

- (1) Remove the upper cover (see 3.3.2).
- (2) Remove power supply connector ① from the control board.
- (3) Remove two screws ② and remove screw ③.
- (4) Remove power supply unit ④ together with cord receptacle ⑤ by lifting.
- (5) For reassembly, reverse the disassembly procedure.



3.3.4.2 PSU-Assy (Switching-Type-only)

⚠ Warning

Risk of Electric Shock

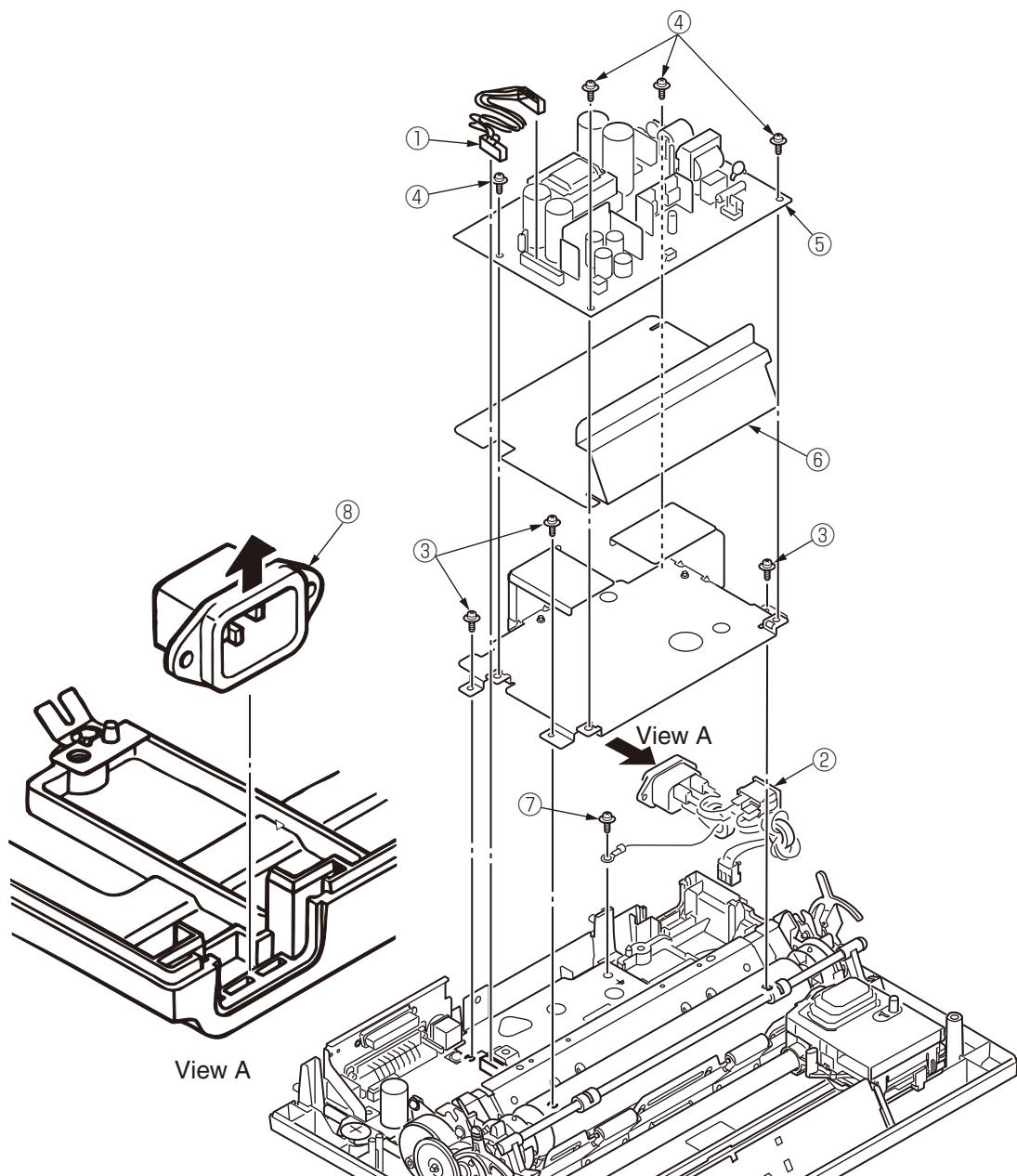


There is a risk of electric shock during replacement of the power supply.

Use insulating gloves or avoid direct contact with any conducting part of the power supply, and caution should be exercised during replacement.

The capacitor may take one minute to complete discharge after the AC cord is unplugged. Also, there is a possibility that the capacitor doesn't discharge because of a breakage of the PCB, etc., so remember the possibility of electric shock to avoid electric shock.

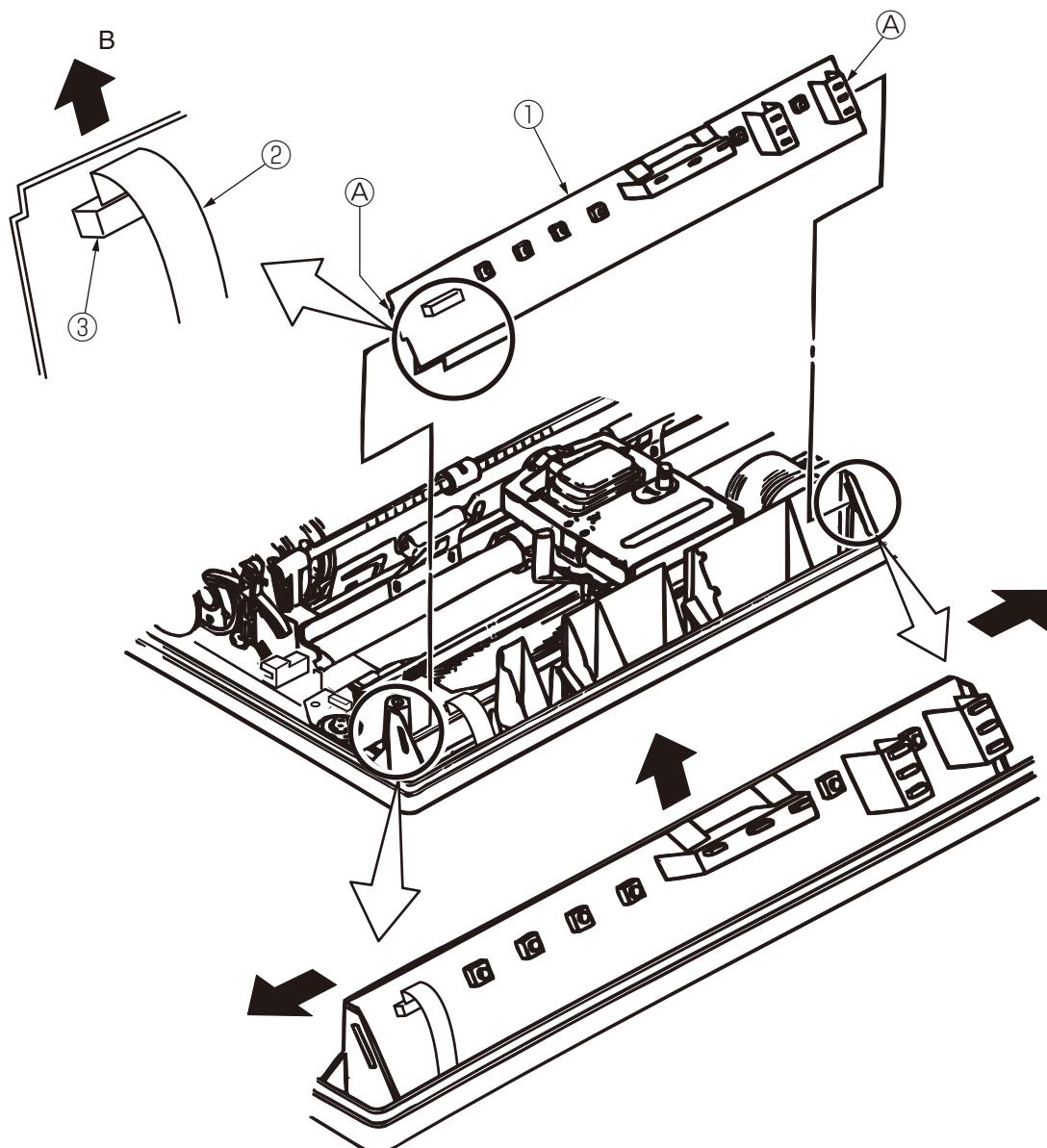
- (1) Remove the upper cover (see 3.3.2).
- (2) Remove Power cord ① from the PCB-Assy and remove AC-Cord ② from PSU Assy.
- (3) Remove three screws ③ and remove PSU-Assy.
- (4) Remove four screws ④ and remove PSU-Borad ⑤ together with a Insulator ⑥, and remove a screw ⑦ and a receptacle ⑧ by lifting.
- (5) For reassembly, reverse the disassembly procedure.



3.3.5 Operation Board

- (1) Remove the upper cover (see 3.3.2).
- (2) Disengage both ends **A** and remove the operation panel **①** by sliding upward.
- (3) Unplug the operation panel cable **②** from the connector **③** (in the direction of the arrow **B**).
- (4) For reassembly, reverse the disassembly procedure.

Note: Be careful not to damage the cable connecting the switch and the connector.

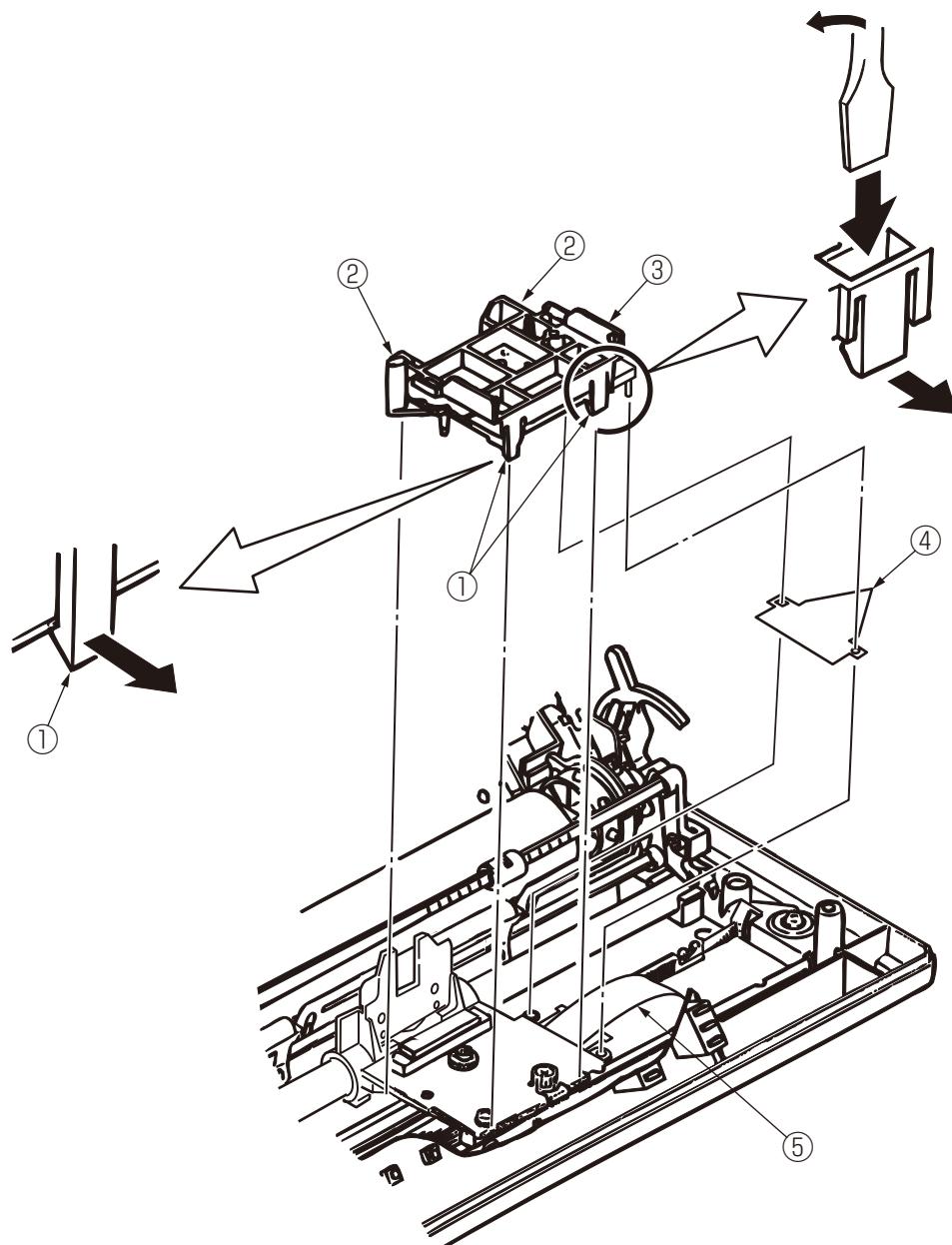


3.3.6 Ribbon-feed Gear Assembly

- (1) Remove the upper cover (see 3.3.2).
- (2) Remove the print head (see 3.3.1).
- (3) Disengage the two front tabs ① and two rear tabs ②. Then lift by inserting small flat screwdriver in the slot.
- (4) Remove ribbon feed gear assembly ③.
- (5) Remove cable holder ④, from ribbon feed gear assembly ③.
- (6) For reassembly, reverse the disassembly procedure.

Notes:

1. Make sure carriage cable ⑤ is not bent.
2. After installing ribbon feed gear assembly ③, check and adjust the gap between the platen and print head (see 4.1). Also, Check and adjust the gap between the space rack and roller.

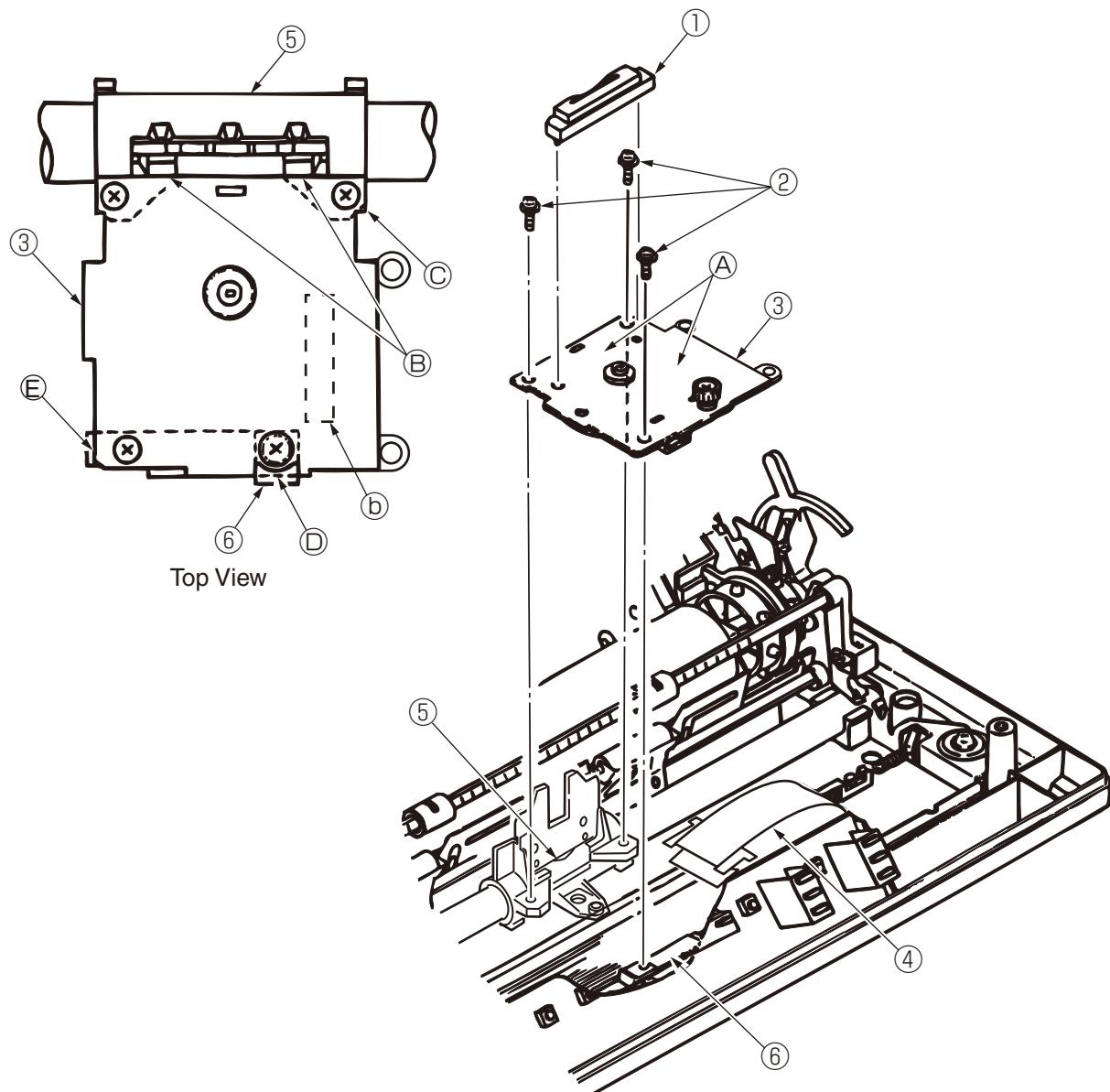


3.3.7 Space Motor Assembly

- (1) Remove the upper cover (see 3.3.2).
- (2) Remove the print head (see 3.3.1).
- (3) Remove the ribbon feed gear assembly (see 3.3.6).
- (4) Remove connector ① while checking the concave surface.
- (5) Remove three screws ②.
- (6) Remove space motor assembly ③.
- (7) Unplug the head cable ④ from the connector ⑤.
- (8) For reassembly, reverse the disassembly procedure.

Notes:

1. When installing space motor assembly ③, place the ⑤ side of the assembly close to carriage frame ⑤, and align the ⑥ side of the assembly with the corresponding side of the carriage frame. Then adjust the gap between the space rack and roller (see 4.2).
2. When installing slider ⑥, place the ⑦ and ⑧ parts of the slider close to space motor assembly ③.
3. After installing space motor assembly, check and adjust the gap between the platen and print head (see 4.1).

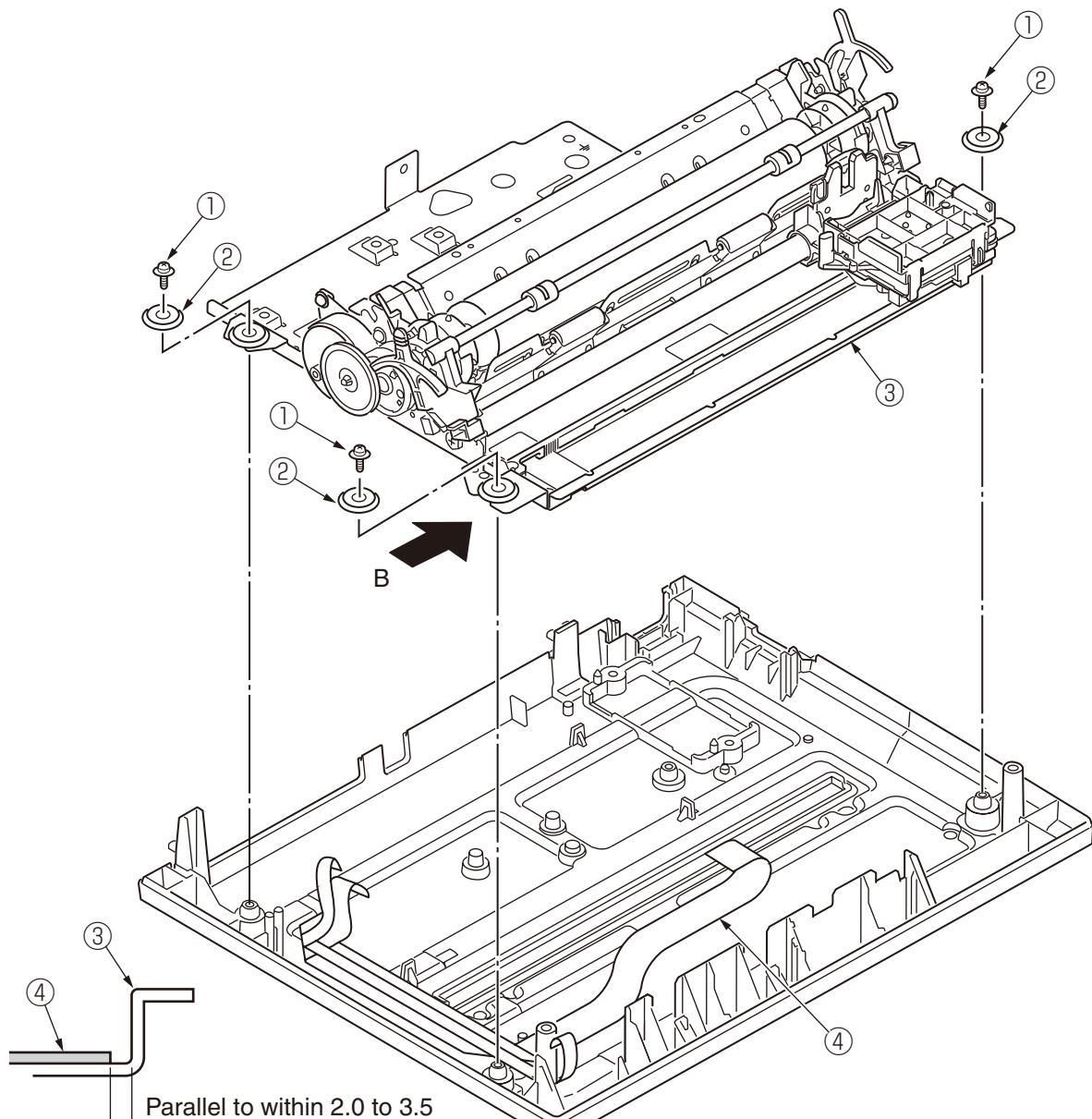


3.3.8 Printer Mechanism

- (1) Remove the upper cover (see 3.3.2).
- (2) Remove the print head (see 3.3.1).
- (3) Remove the control board (see 3.3.3).
- (4) Remove the power supply (see 3.3.4).
- (5) Remove the ribbon-feed gear assembly (see 3.3.6).
- (6) Remove the space motor assembly (see 3.3.7).
- (7) Remove four screws ① and washers ② .
- (8) Lift the printer mechanism ③ to detach it.
- (9) For reassembly, reverse the disassembly procedure.

Notes:

1. *In lifting the printer mechanism ③ , take care not to damage cables etc ④ .*
2. *When reinstalling the printer mechanism, bond it, securing the space shown in figure A so as not to allow slack in it.*



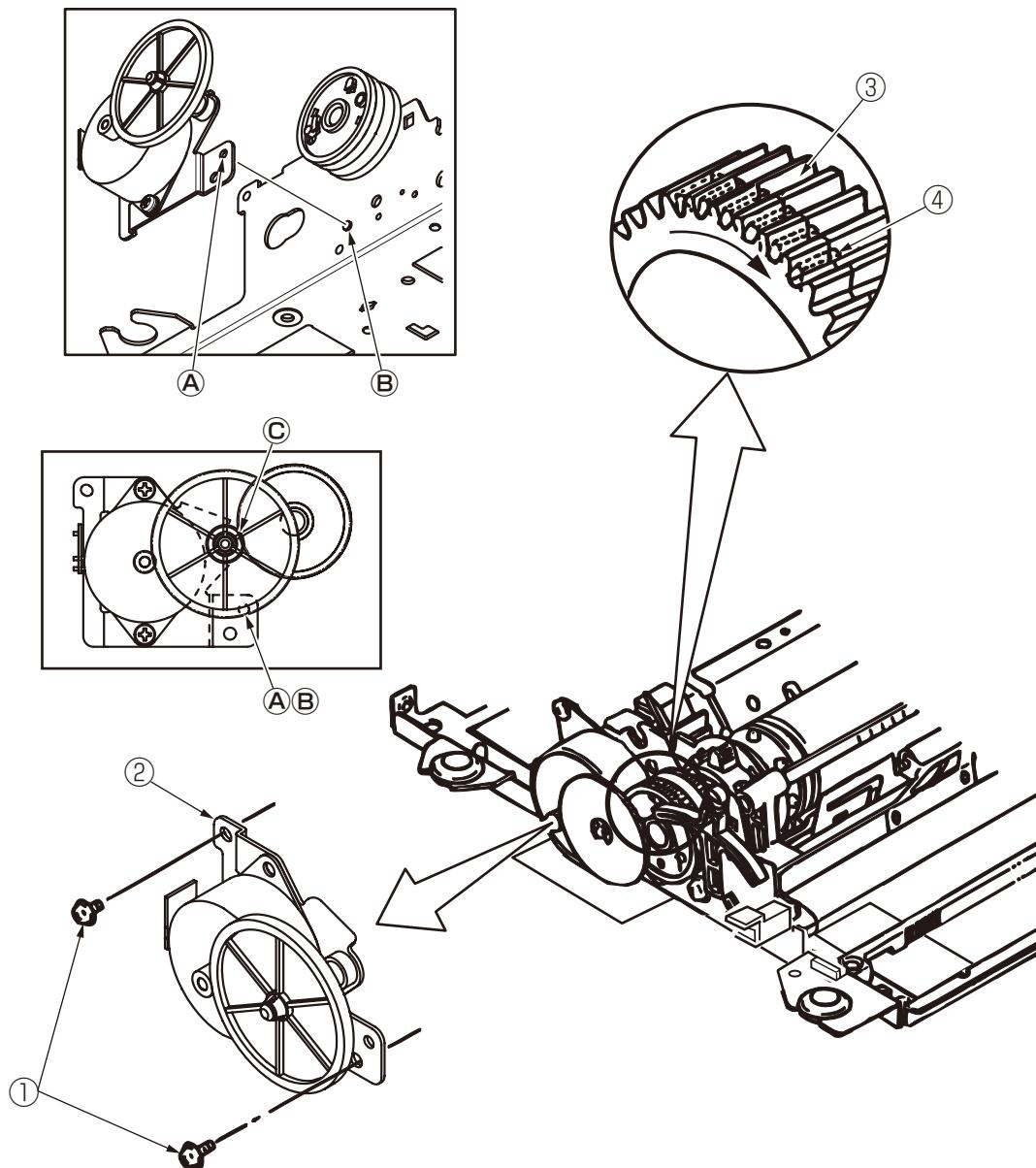
3.3.9 LF Motor Assembly

3.3.9.1 New LF Motor

- (1) Remove the printer mechanism (see 3.3.8)
- (2) Remove two screws ① .
- (3) Remove LF motor assembly ② .
- (4) For reassembly, reverse the disassembly procedure.

Notes:

1. When assembling, match the teeth of platen gear ③ and bias gear ④ , then engage the gear at ② . (Bias gear ④ is offset from platen gear ③ by half the width of a tooth. Turn the bias gear half a tooth width in the direction of the arrow to align two teeth.)
2. Fit the holes of ① in LF-Motor into the punch of printer mechanism, tighten the screw while rotating around ①② so that it engages with ③, and Install it.
3. After assembling, make sure that ③ is correctly engaged and the platen turns smoothly.

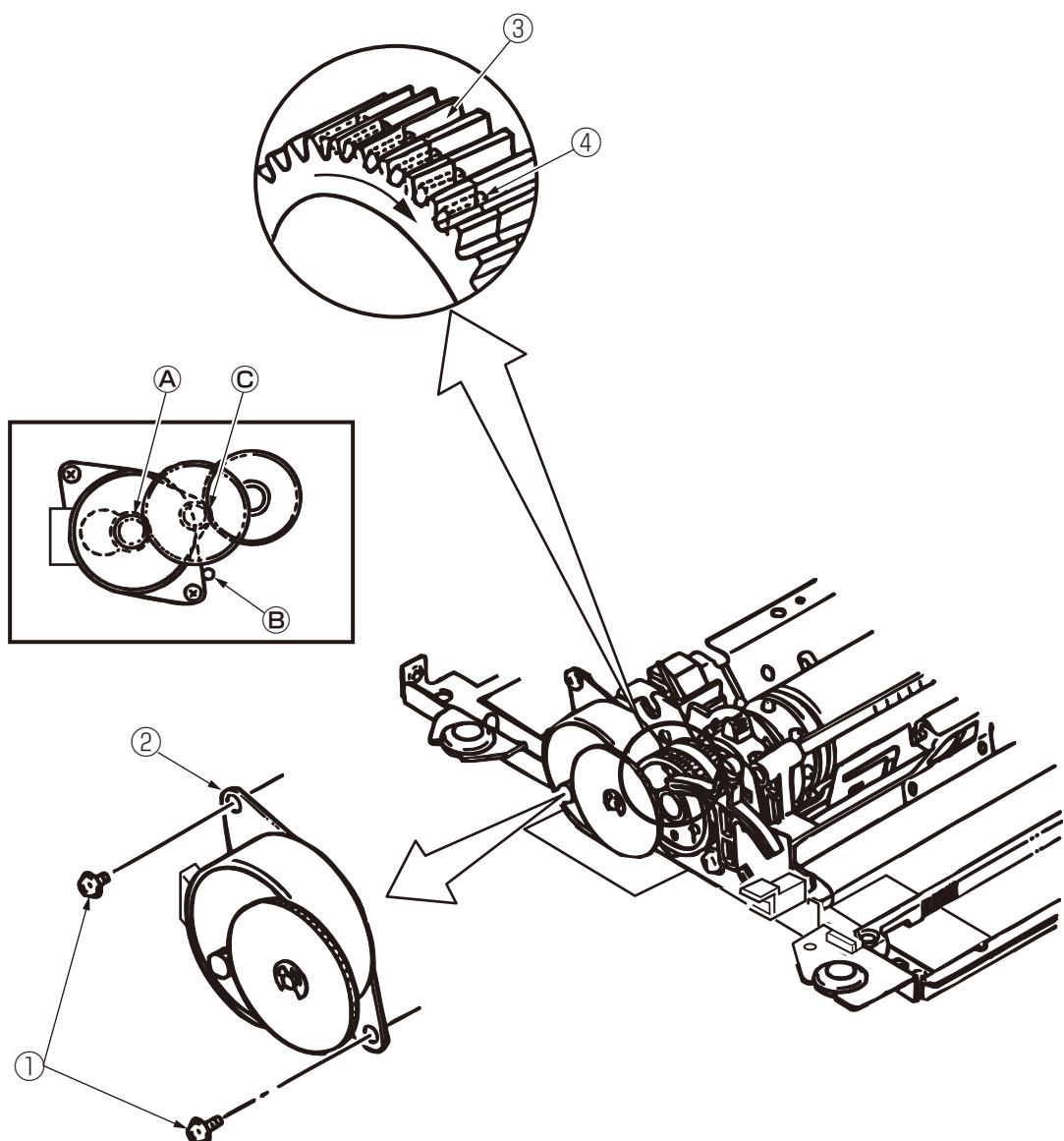


3.3.9.2 Old LF Motor

- (1) Remove the printer mechanism (see 3.3.8)
- (2) Remove two screws ①.
- (3) Remove LF motor assembly ②.
- (4) For reassembly, reverse the disassembly procedure.

Notes:

1. When assembling, match the teeth of platen gear ③ and bias gear ④, then engage the gear at ②. (Bias gear ④ is offset from platen gear ③ by half the width of a tooth. Turn the bias gear half a tooth width in the direction of the arrow to align two teeth.)
2. Install the LF motor while pressing it against ④ and ②.
3. After assembling, make sure that the platen gear ③ is correctly engaged and the platen turns smoothly.

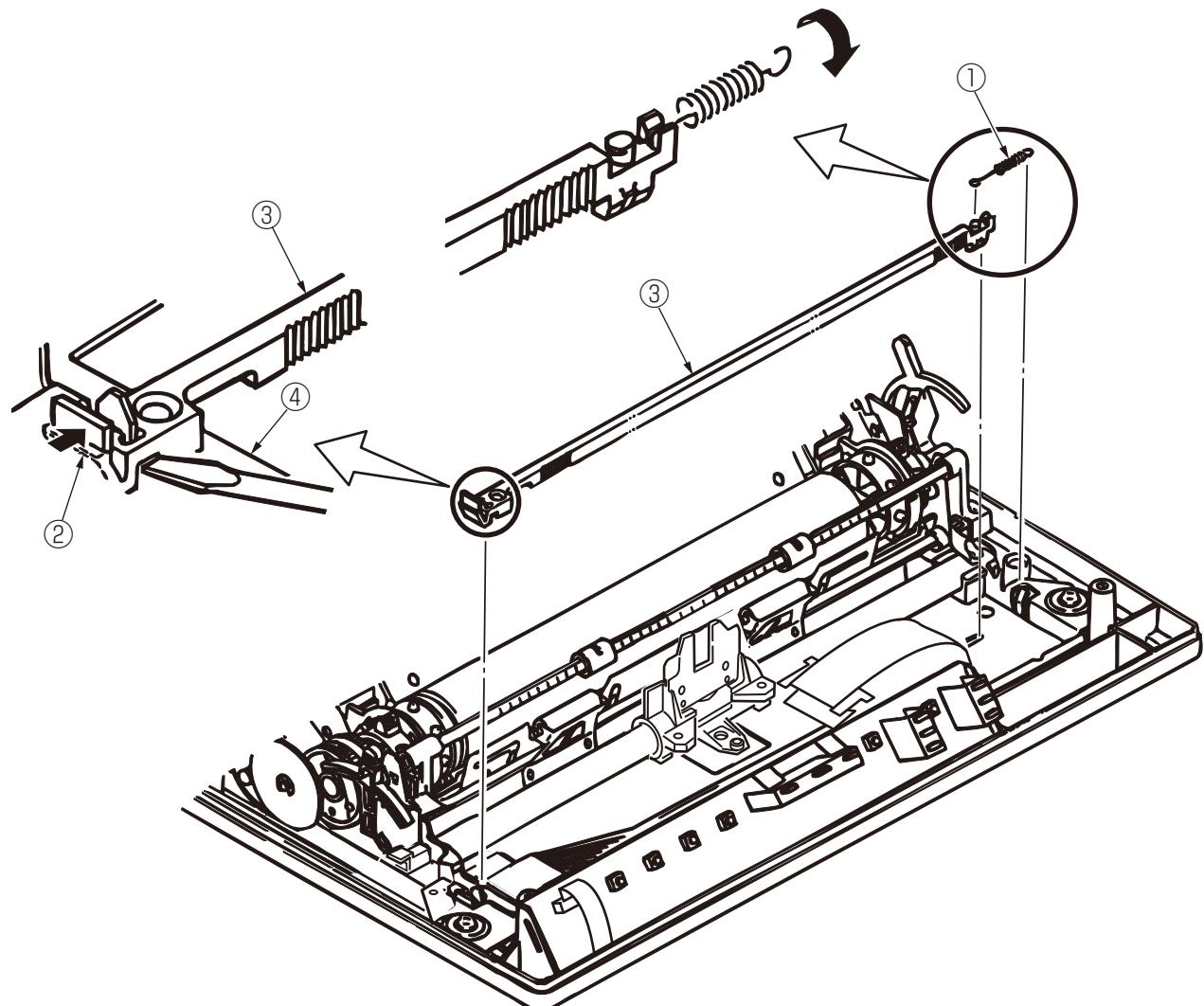


3.3.10 Space Rack

- (1) Remove the upper cover (see 3.3.2).
- (2) Remove the print head (see 3.3.1).
- (3) Remove the ribbon feed gear assembly (see 3.3.6)
- (4) Remove the space motor assembly (see 3.3.7).
- (5) Remove spring ①.
- (6) Disengage tab ②.
- (7) Remove the space rack by inserting a flat screwdriver between space rack ③ and base frame ④ and gently lifting the space rack.
- (8) For reassembly, reverse the disassembly procedure.

Notes:

1. After installing the ribbon feed gear assembly, check and adjust the gap between the platen and print head (see 4.1). Also check and adjust the gap between the space rack and roller (see 4.2).
2. When installing spring ①, twist the right end of the spring 90 degrees counter-clockwise.

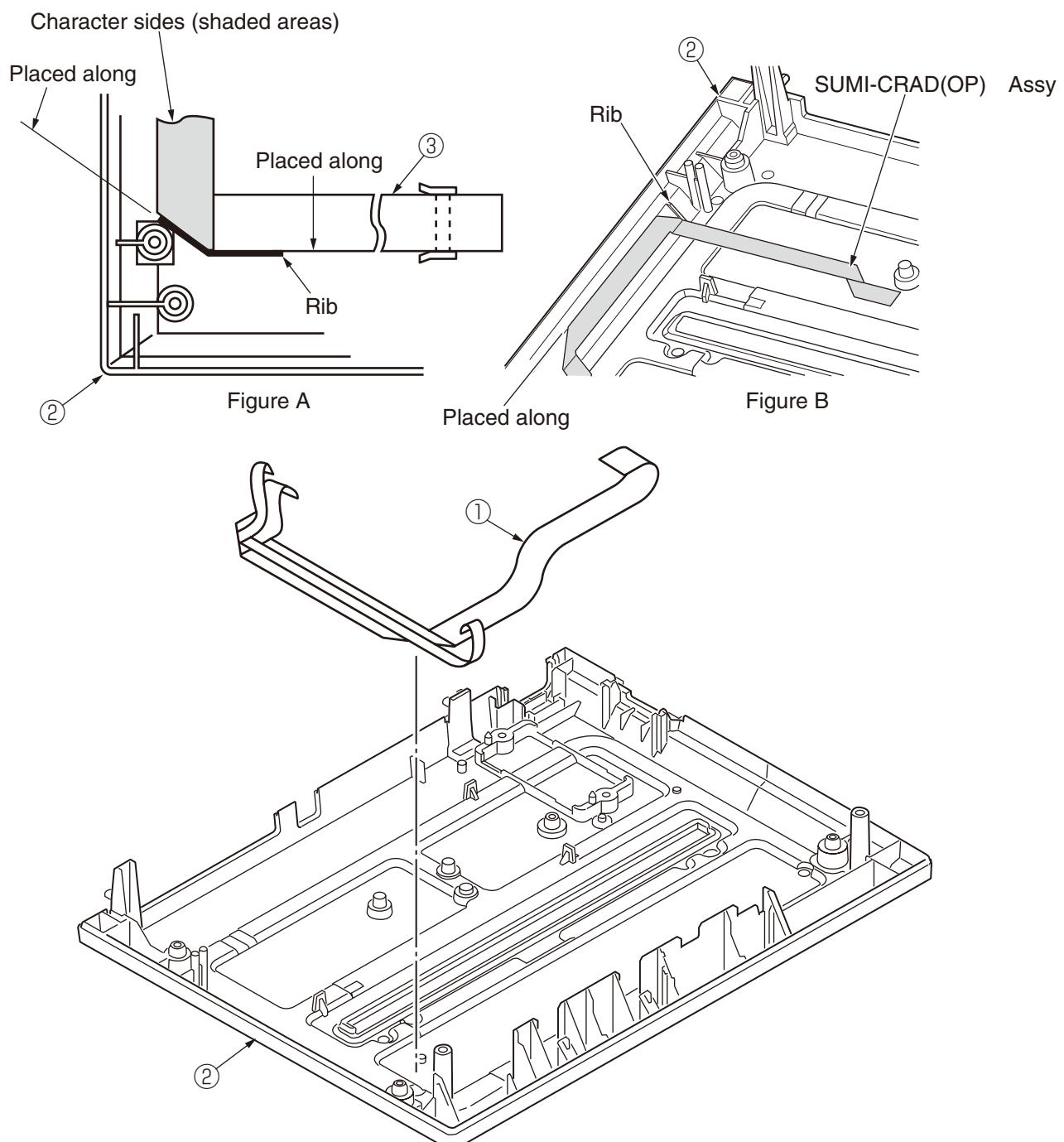


3.3.11 SUMI-CRAD(Head), SUMI-CRAD(OP) assembly *Except for T&T

- (1) Remove the printer mechanism (see 3.3.8).
- (2) Detach the SUMI-CRAD(Head), SUMI-CRAD(OP) assembly ① from the lower cover ②.

Notes:

1. When bonding the SUMI-CRAD(Head) assembly, place it along the inner surface of the rib of the lower cover (figure A).
2. When bonding the SUMI-CRAD(OP) assembly, place it along the inner surface of the rib of the lower cover (figure B).
3. Make sure the carriage cable ③ is not bent.
4. After installing the space motor assembly, check and adjust the gap between the platen and print head (see 4.1). Also check and adjust the gap between the space rack and roller (see 4.2).

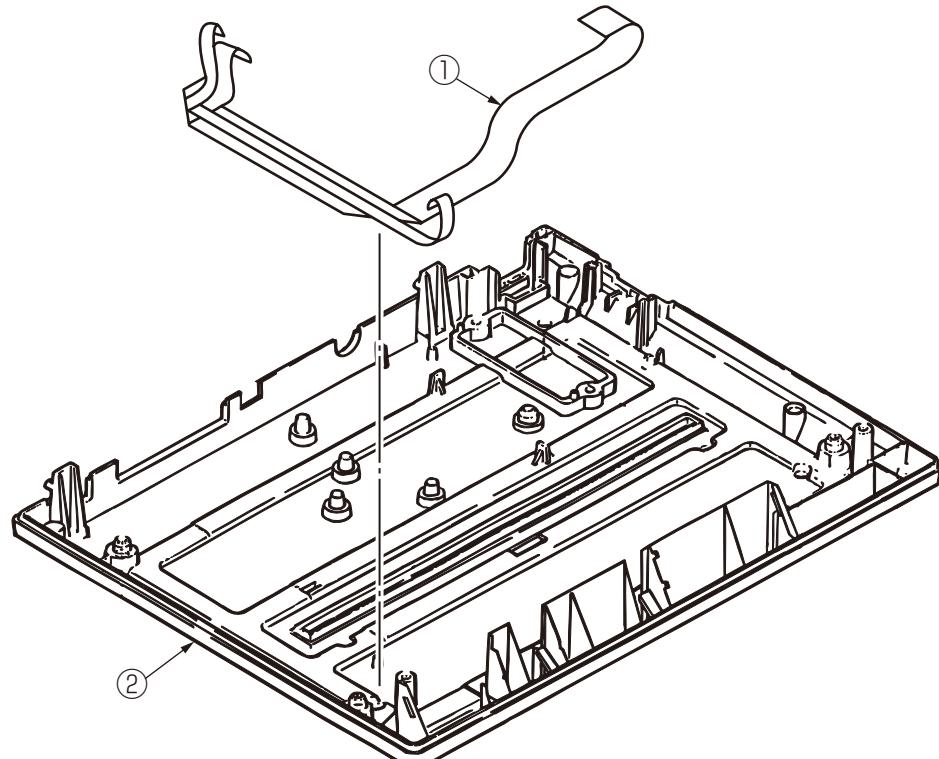
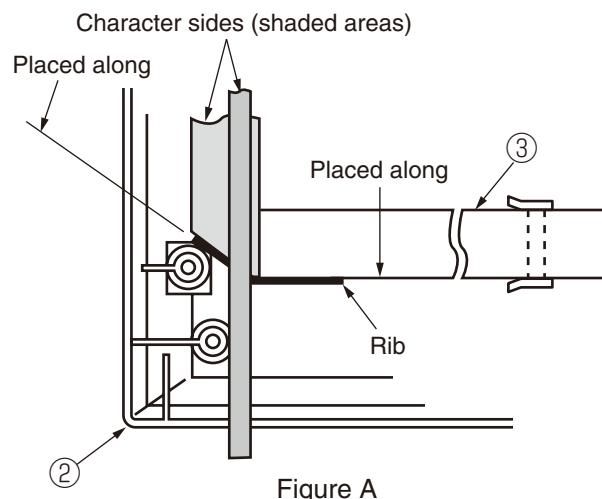


3.3.11 Cable assembly *For T&T

- (1) Remove the printer mechanism (see 3.3.8).
- (2) Detach the cable assembly ① from the lower cover ②.

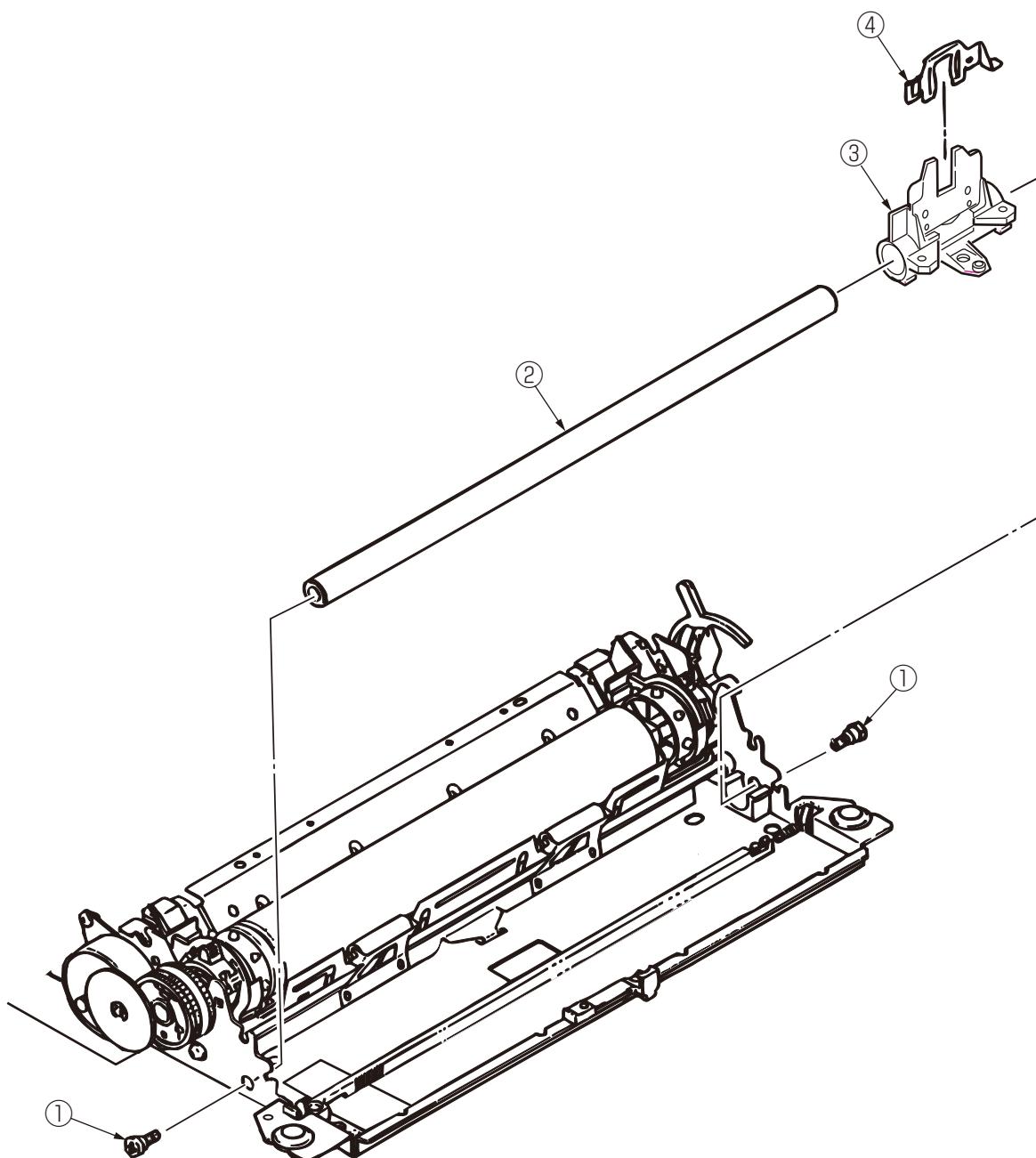
Notes:

1. When bonding the cable assembly, place it along the inner surface of the rib of the lower cover (figure A).
2. Make sure the carriage cable ③ is not bent.
3. After installing the space motor assembly, check and adjust the gap between the platen and print head (see 4.1). Also check and adjust the gap between the space rack and roller (see 4.2).



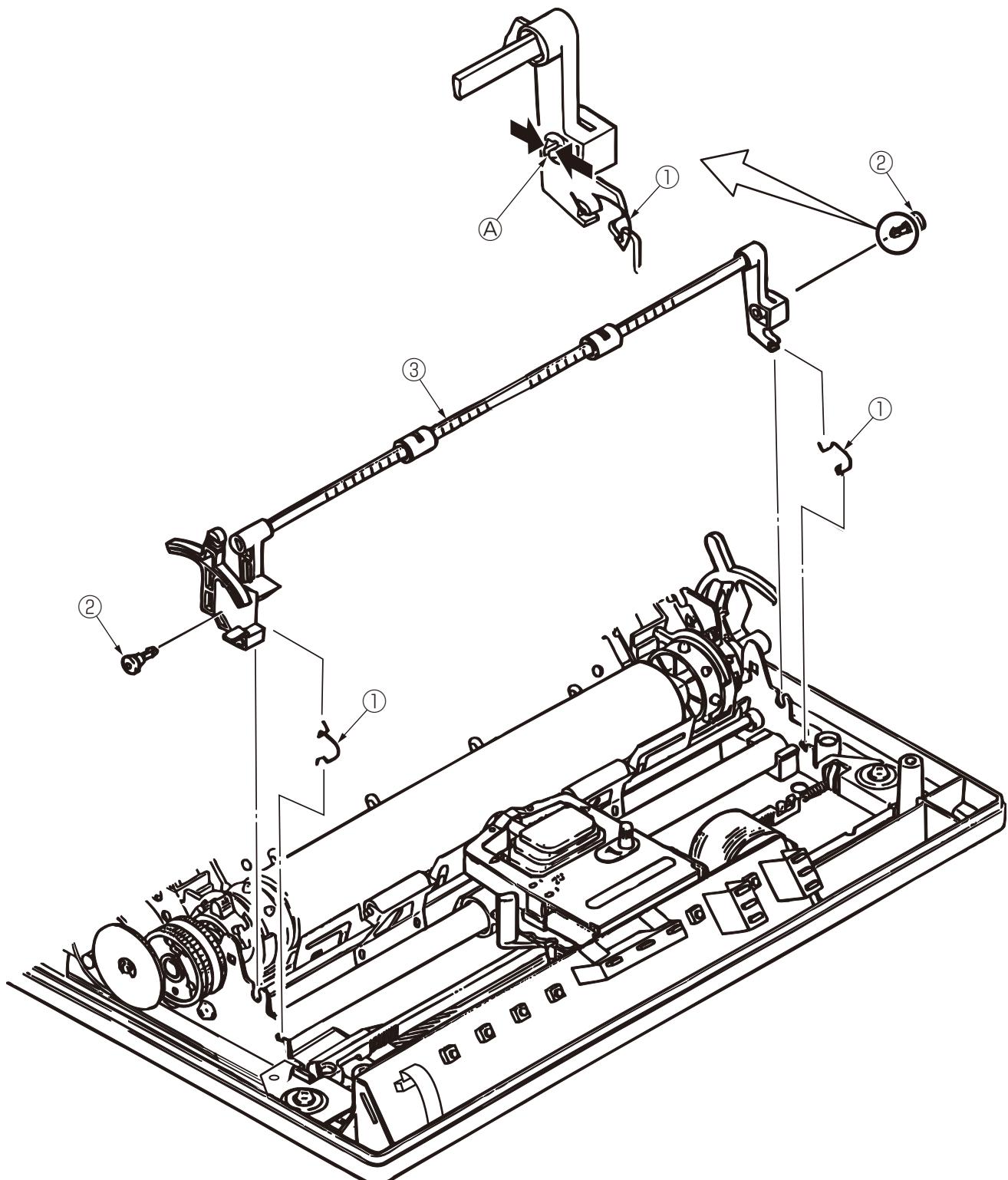
3.3.12 Carriage Frame

- (1) Remove the upper cover (see 3.3.2)
- (2) Remove the printer mechanism. (See 3.3.8)
- (3) Remove the column indicator bar (see 3.3.13).
- (4) Remove two screws on both sides ① .
- (5) Remove the carriage shaft ② together with carriage frame ③ .
- (6) Remove the carriage frame ③ from carriage shaft ② .
- (7) Remove the head clamp ④ .
- (8) For reassembly, reverse the disassembly procedure.



3.3.13 Column Indicator Bar

- (1) Remove the upper cover (see 3.3.2)
- (2) Remove two springs ① .
- (3) Remove two push shafts ② by squeezing the pins Ⓐ in the direction of the arrow.
- (4) Remove column indicator bar ③ .
- (5) For reassembly, reverse the disassembly procedure.

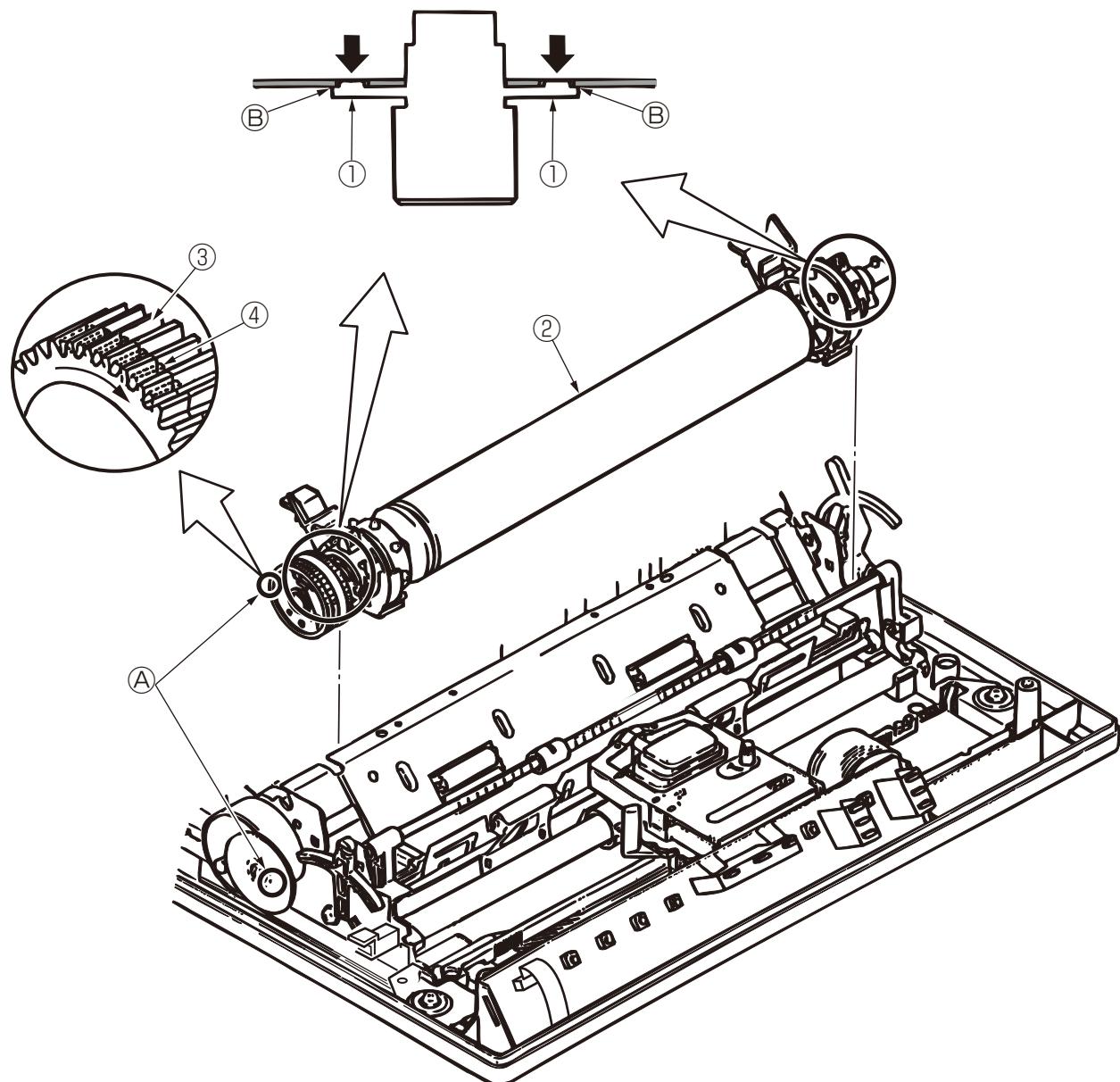


3.3.14 Platen Assembly

- (1) Remove the upper cover (see 3.3.2).
- (2) Disengage four tabs ① by gently pushing tabs from side plate ② on each side.
- (3) Remove platen assembly ③.
- (4) For reassembly, reverse the disassembly procedure.

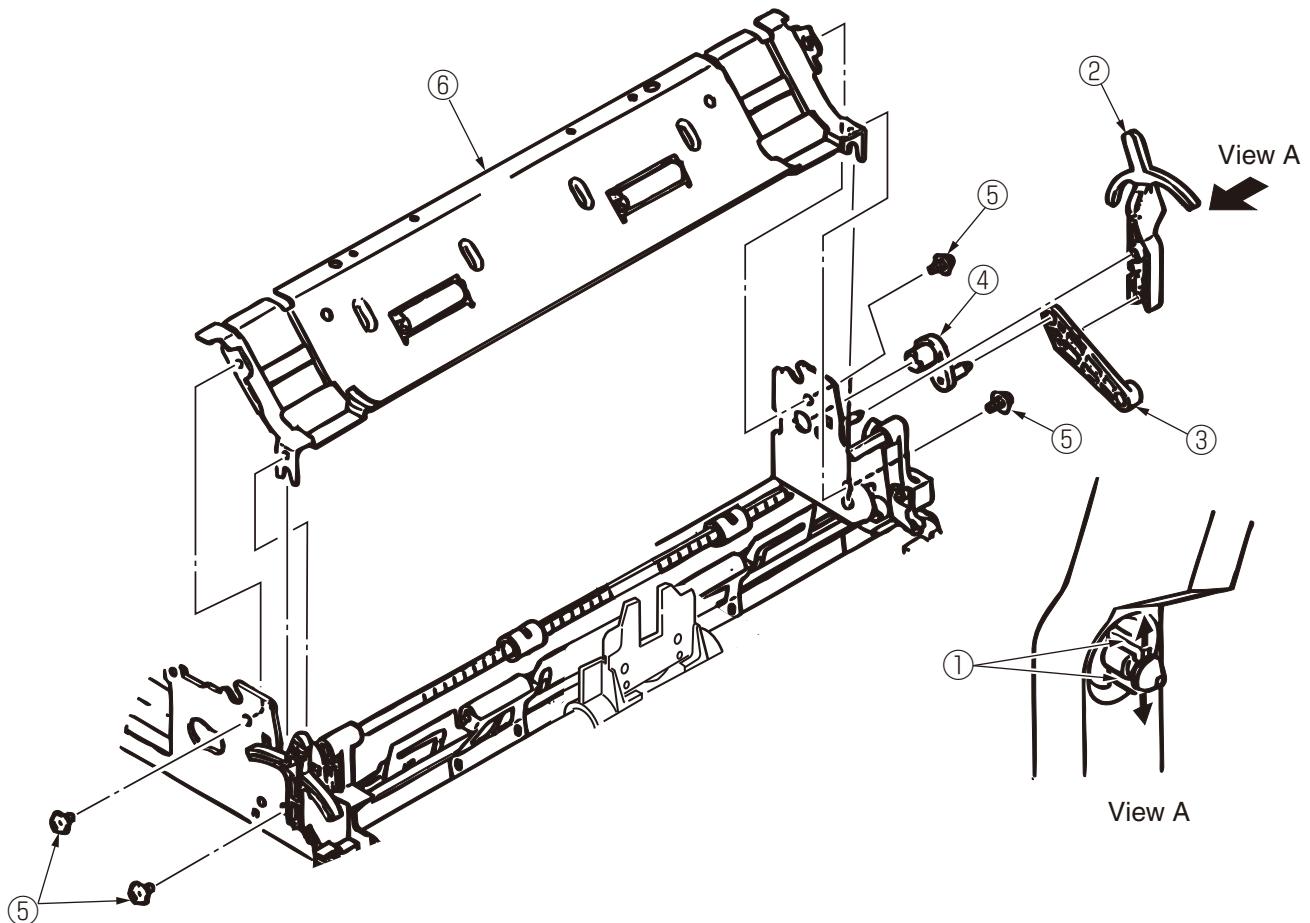
Notes:

1. When assembling, match the teeth of platen gear ③ and bias gear ④, then engage the gear at ⑤. (Bias gear ④ is offset from platen gear ③ by half the width of a tooth. Turn the bias gear half a tooth width in the direction of the arrow to align two teeth.)
2. After assembling, make sure that the platen gear is correctly engaged and the platen turns smoothly.



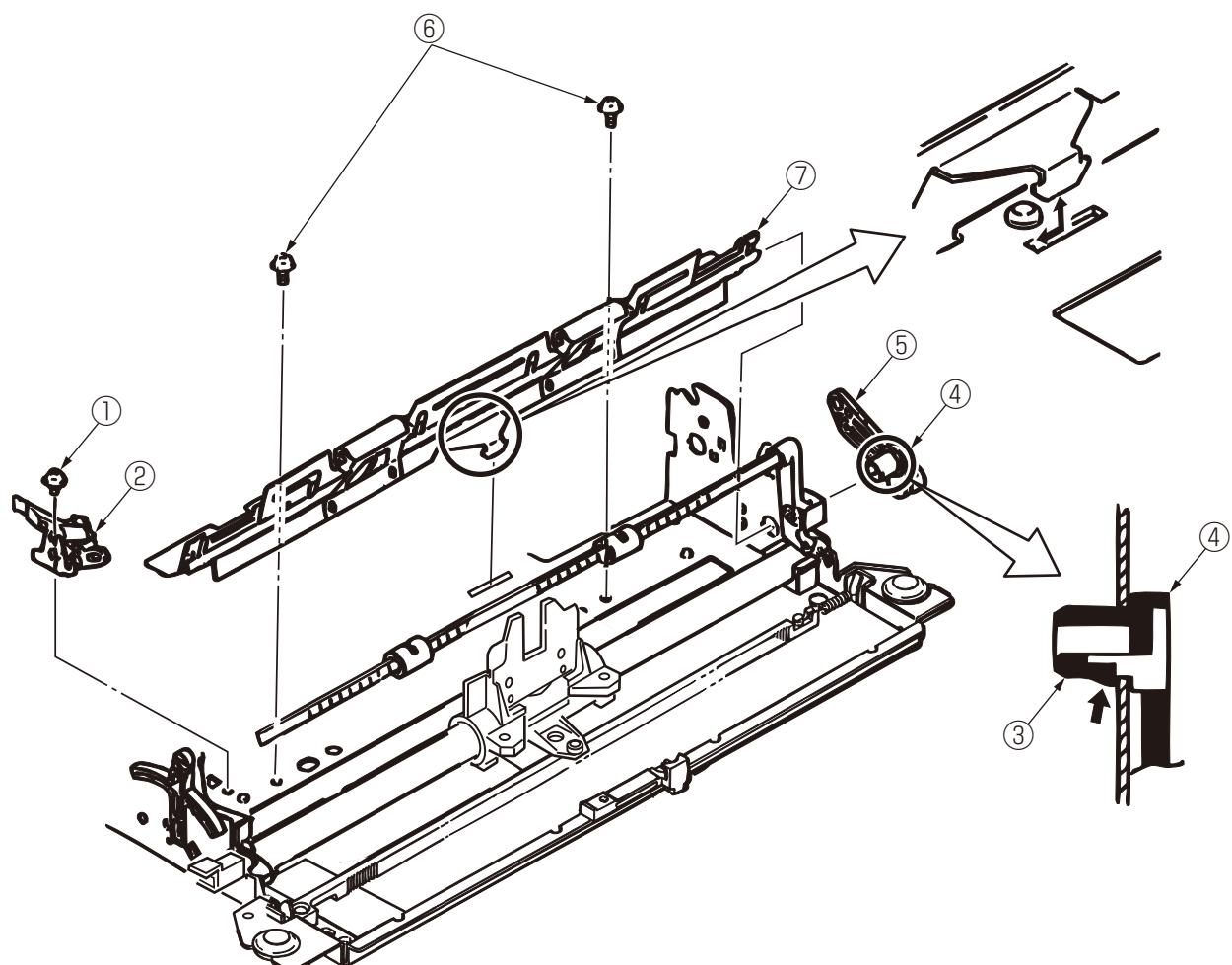
3.3.15 Paper-chute Assembly

- (1) Remove the upper cover (see 3.3.2).
- (2) Remove the printer mechanism. (See 3.3.8)
- (3) Remove the LF motor assembly (see 3.3.9).
- (4) Remove the platen assembly (see 3.3.14).
- (5) Open two tabs ① with a flat screwdriver, then remove paper lock release lever ②. (Be careful with the tabs because they are very small.)
- (6) Disengage middle release link ③ from rear release link ④, and remove rear release link ④.
- (7) Remove four screws ⑤ (two on each side).
- (8) Remove paper chute assembly ⑥.
- (9) For reassembly, reverse the disassembly procedure.



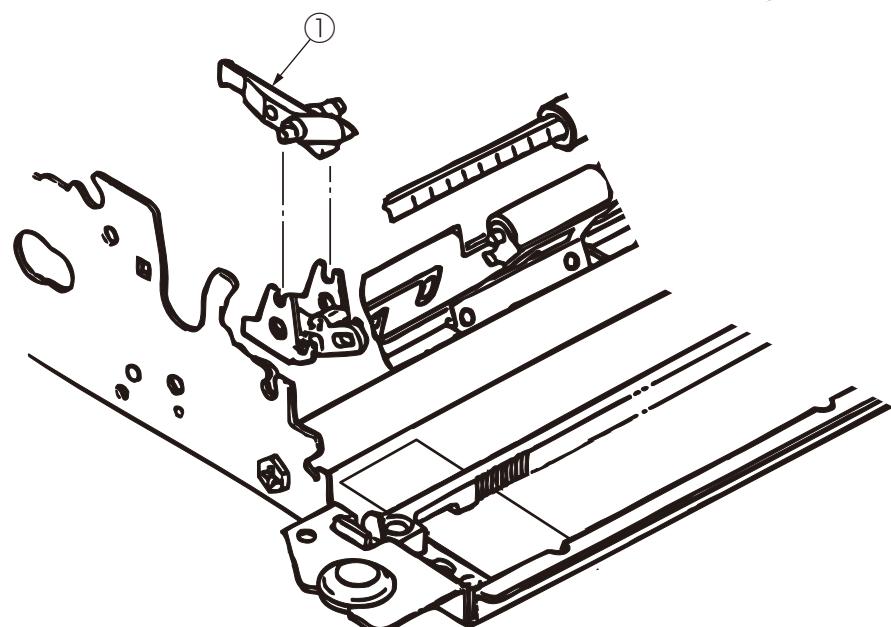
3.3.16 Bottom Paper Guide Assembly

- (1) Remove the upper cover (see 3.3.2).
- (2) Remove the printer mechanism. (See 3.3.8)
- (3) Remove the LF motor assembly (see 3.3.9).
- (4) Remove the platen assembly (see 3.3.14)
- (5) Remove the paper-chute assembly (see 3.3.15).
- (6) Remove screw ①, then remove near-end lever assembly ②.
- (7) Close tab ③ and remove front release link ④ together with middle release link ⑤.
- (8) Remove two screws ⑥ and remove bottom paper guide assembly ⑦.
- (9) For reassembly, reverse the disassembly procedure.



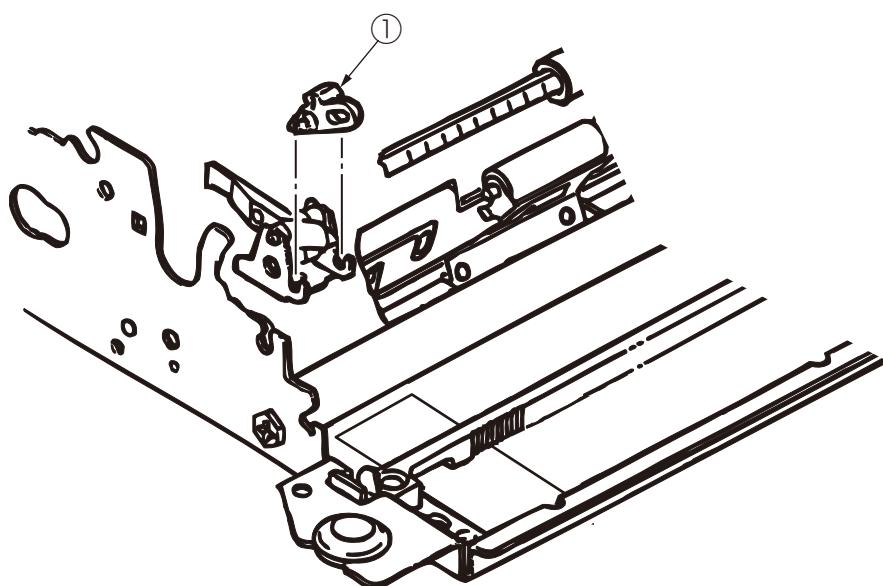
3.3.17 Near-end Lever and Bracket

- (1) Remove the upper cover (see 3.3.2).
- (2) Remove the printer mechanism. (See 3.3.8)
- (3) Remove the LF motor assembly (see 3.3.9).
- (4) Remove the platen assembly (see 3.3.14).
- (5) Remove the paper-chute assembly (see 3.3.15).
- (6) Remove near-end lever ① .
- (7) For reassembly, reverse the disassembly procedure.



3.3.18 Bottom Near-end Lever

- (1) Remove the upper cover (see 3.3.2).
- (2) Remove the printer mechanism. (See 3.3.8)
- (3) Remove the LF motor assembly (see 3.3.9).
- (4) Remove the platen assembly (see 3.3.14).
- (5) Remove the paper-chute assembly (see 3.3.15).
- (6) Remove bottom near-end lever ① .
- (7) For reassembly, reverse the disassembly procedure.

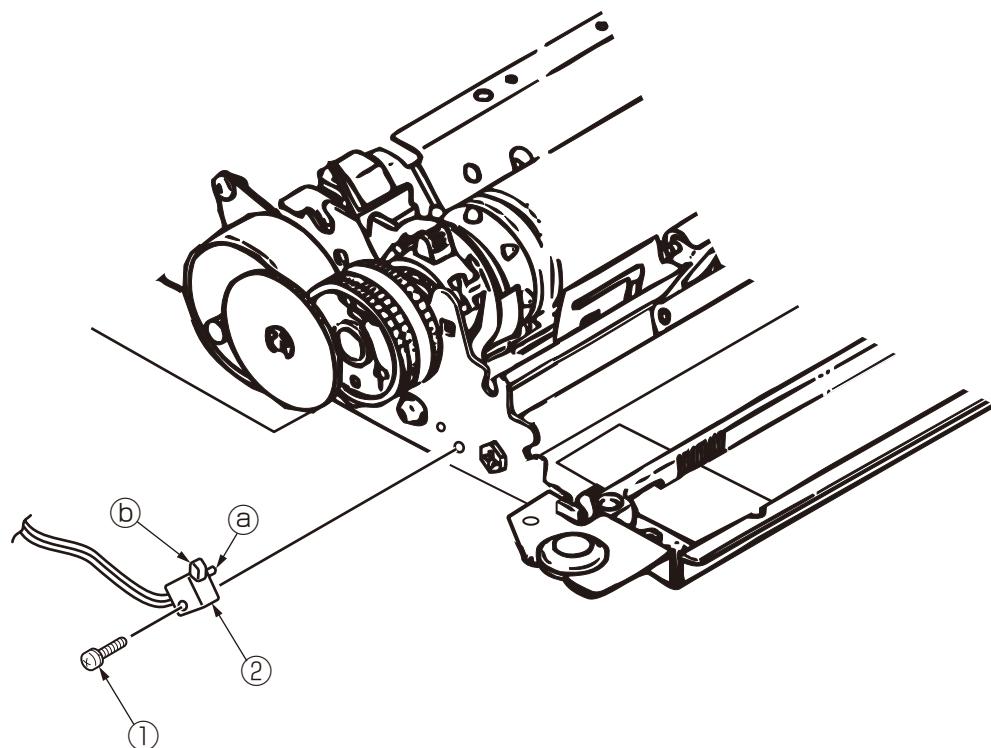


3.3.19 Switch assembly

- (1) Remove the upper cover (see 3.3.2).
- (2) Remove the printer mechanism. (See 3.3.8)
- (3) Remove the screw ① .
- (4) Detach the switch assembly ② .
- (5) For reassembly, reverse the disassembly procedure.

Notes:

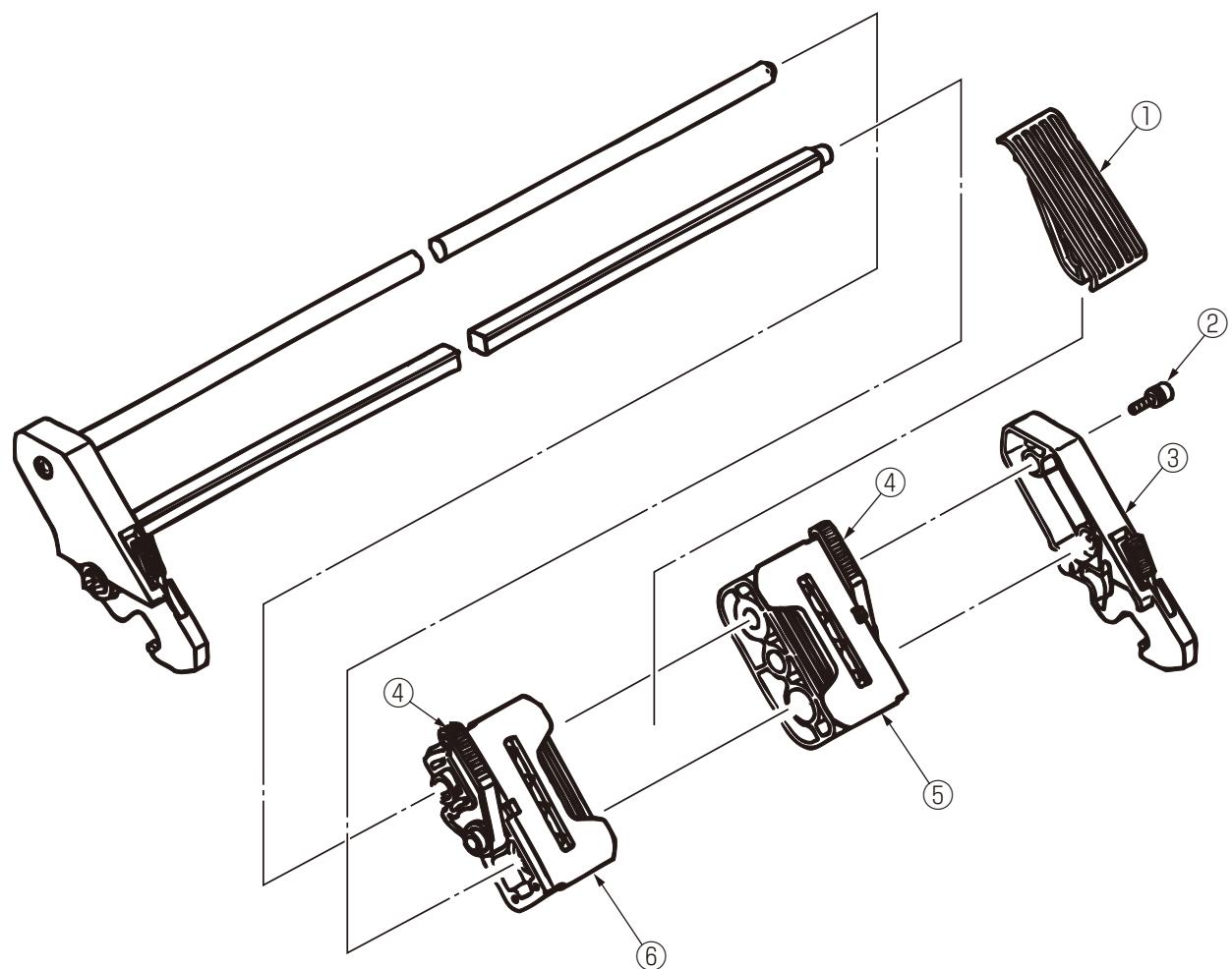
1. The switch assembly should be detached or reattached with the bail lever placed in its closed position (backward).
2. Observe the orientation of the sensor lever ⑥ .
3. When reinstalling the switch assembly, be sure that the boss ④ of the sensor ② is aligned with the hole on the frame, and fasten it with the screw ① .



3.3.20 Pin Tractor Assemblies (R and L)

- (1) Remove the sheet guide ① .
- (2) Remove screw ② .
- (3) Remove side frame ③ .
- (4) Unlock lock lever ④ , and remove left ⑥ and right ⑤ pin tractor assemblies.
- (5) For reassembly, reverse the disassembly procedure.

Note: When assembling, verify that the left and right sprockets are aligned.



4. ADJUSTMENT

4.1 Head-Gap Adjustment

Tools:

- Thickness gauge set
- Phillip's screwdriver No. 2-200
- Metal rod about 0.04 inch (1 mm) in diameter and 3 inches (76 mm) long (an extended paper clip can be used)

Adjustment procedure (see figure 4-1)

- (1) Turn OFF the AC POWER switch and remove the AC plug from the AC receptacle.
- (2) Remove the access cover.
- (3) Remove the ribbon cartridge.
- (4) Set the adjusting lever to range 1.
- (5) Tilt the paper lock release lever back.
- (6) Insert a 0.019-inch (0.45-mm) thickness gauge between the platen and print head. Make sure that the thickness gauge can be smoothly inserted, although there may be slight friction. Perform this operation at both ends of the platen.
- (7) If gap adjustment is required, press down the adjusting gear with the metal rod to disengage the gear from the adjusting lever, and adjust the gap by turning the adjusting screw with a screwdriver.
- (8) After adjustment, move the adjusting lever from position 1 to 3 to 1, then check the gap between the platen and print head once more. The gap must be between 0.0165 and 0.019 inch (0.42 to 0.48 mm).

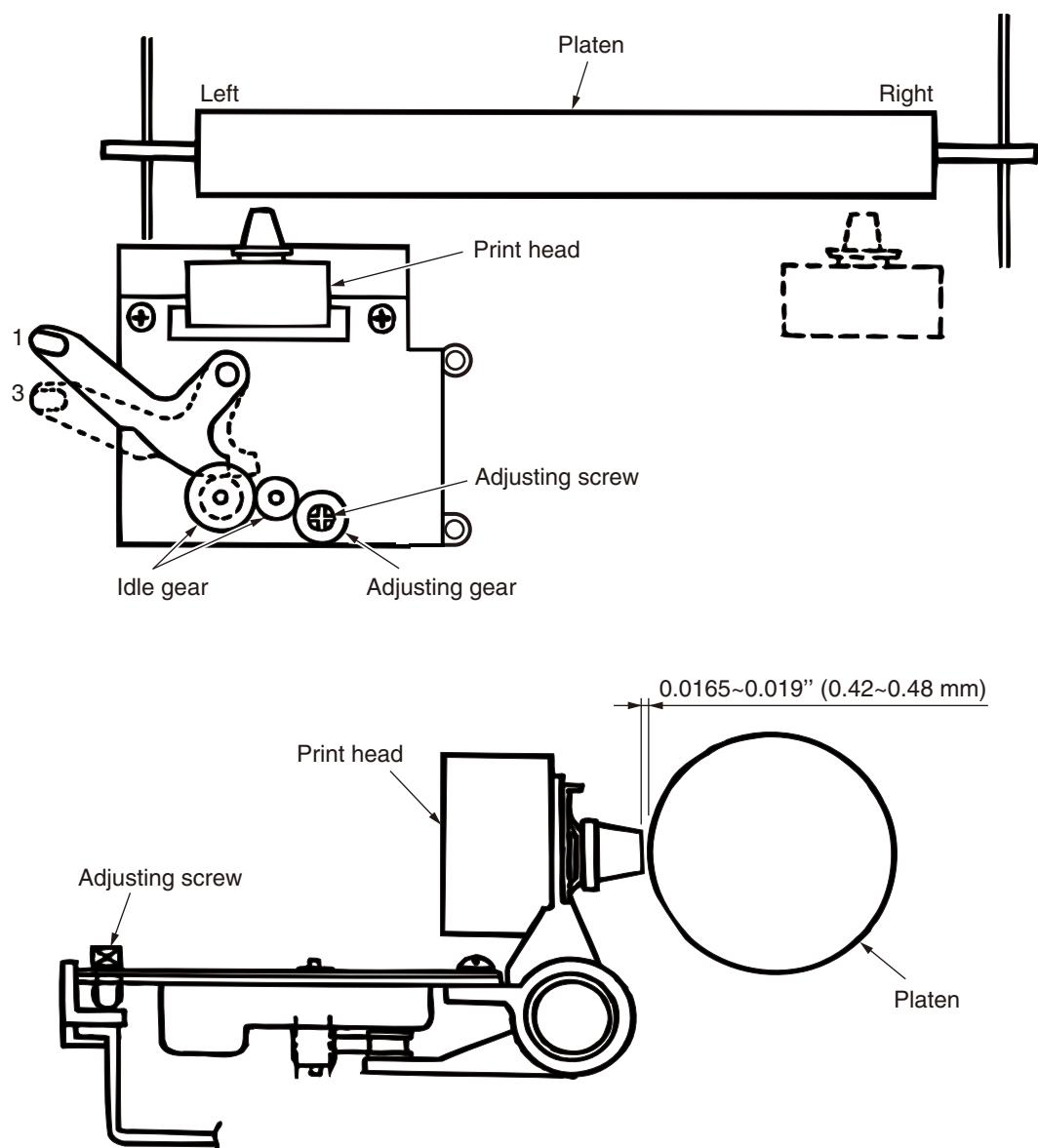


Figure 4-1 Head-Gap Adjustment

4.2 Space Rack and Roller-Gap Adjustment

Tools:

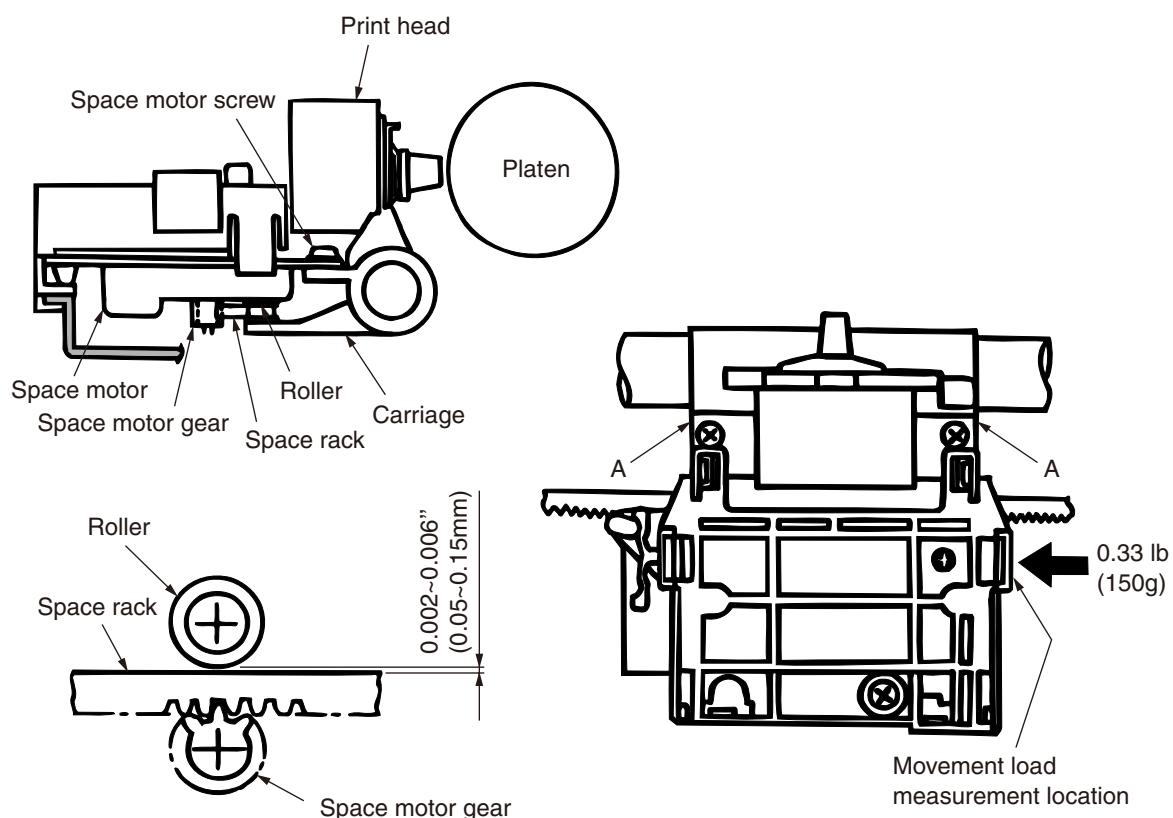
- Thickness gauge
- Phillip's screwdriver No. 2-200
- Tension guage, 250 g

Adjustment procedure

- (1) Turn OFF the AC POWER switch and remove the AC plug from the AC receptacle.
- (2) Remove the upper cover.
- (3) Remove the ribbon cartridge.
- (4) Insert a 0.1-mm thickness gauge between the space rack and roller. Make sure that the thickness gauge can be smoothly inserted, although there may be slight friction.
- (5) If adjustment is required, loosen the space motor screws with a screwdriver and adjust.

Note: Match side A with the corresponding carriage frame surface when attaching.

- (6) After adjustment, check the gap between the space rack and roller once more. The gap must be between 0.002 and 0.006 inch (0.05 to 0.15 mm). Also check that the carriage movement load without ribbon cartridge is 0.33 lb (150 g) or less.



5. CLEANING AND LUBRICATION

5.1 Cleaning

Cautions:

1. Be sure to turn OFF the AC POWER switch before cleaning.
2. Be careful not to let paper lint get inside the mechanism.

The printer should be cleaned periodically as follows:

Period: Either 6 months or 300 operating hours, whichever comes first.
 Required time: Approximately 10 minutes.
 Tools: Dry, soft cloth (such as gauze)(and vacuum cleaner if available)
 Parts to be cleaned: See table 5-1.

Table 5-1 Parts To Be Cleaned

Parts	Description
Carriage and its surroundings	Remove paper lint, dust, dirt, and ribbon lint. Clean platen pinch rollers with cleaning fluid.
Paper path	
Paper-end sensor	Remove paper lint and dust attached to the sensor.

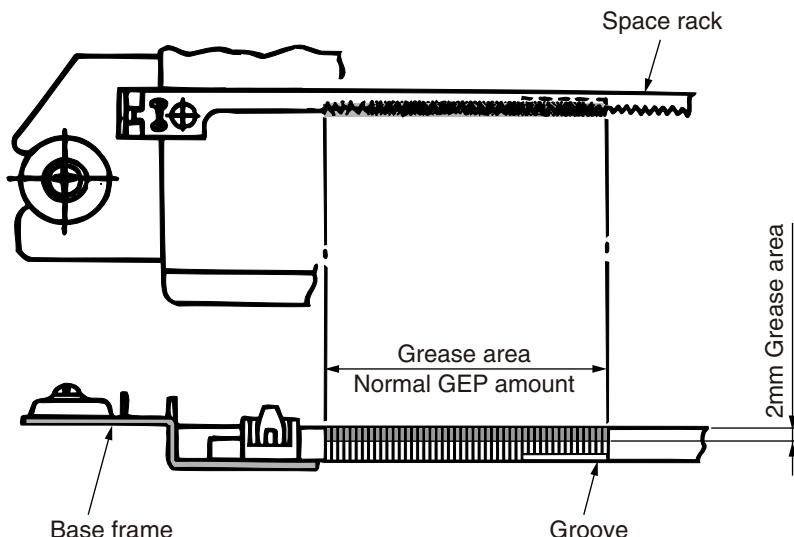
5.2 Lubrication

This printer requires no oiling during normal operation. Oiling must be performed, however, when disassembling, reassembling, after cleaning oiled parts, and after replacing parts.

Type of grease: Albania grease #2EP (Shell Oil equivalent product) GEP

Locations: See figure below.

Note: Do not apply any grease to carriage shaft or along paper path (platen, roller, etc.).



Space Rack Greasing Locations

6. TROUBLESHOOTING AND REPAIR

6.1 Items To Be Checked Before Repair

When there is a user request for repair, check whether the printer can be fixed by the troubleshooting procedure described in the User's Manual.

If possible, ask the user about the conditions that caused the error and make a record of the answer.

Before troubleshooting, operate the printer under the same conditions as at the time of error and see whether the error can be reproduced. If the error cannot be reproduced, run a print test and proceed with troubleshooting.

6.2 Finding the Cause of Error

First check the error condition against table 6-1. Then follow instructions in 6-3. Troubleshooting, to find the actual cause of error.

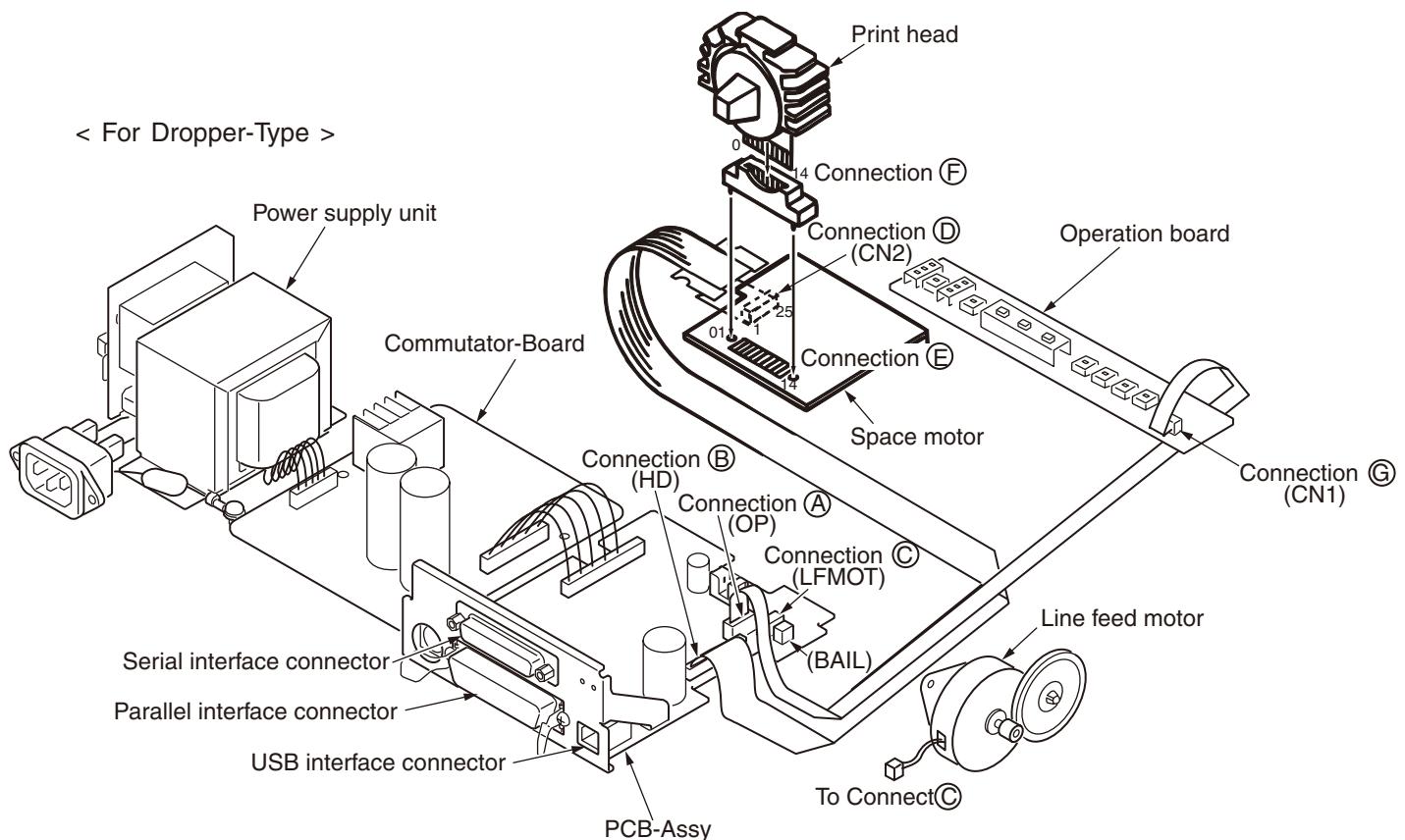
Read the precautions in 3-1 before repairing.

Figure 6-1 shows the connector locations and pin numbers. Table 6-2 shows the pin signal names. Figure 6-1 shows the Control and Operation board checkpoints.

Table 6-1 Error Conditions

Error Type	Description	Item
During POWER ON	The carriage does not move.	①
	The carriage does not move and the POWER lamp is lit.	②
	Carriage moves abnormally (runaway, vibration, or incomplete homing) and POWER lamp is lit.	③
	Homing operation is normal, but indicators are abnormal.	④
	Only Dropper-Type : Fuse (F1) on the AC power supply unit is blown.	⑤
During data receive or print	Neither spacing nor printing is performed and POWER and SELECT lamps are lit (parallel interface).	⑥
	Spacing is normal, but does not print.	⑦
	Printing stops.	⑧
	Wrong characters printed or some characters not printed.	⑨
	Some dots not printed.	⑩
	Print is too light.	⑪
	Line feed not performed.	⑫
	Only Dropper-Type : Fuse (F1) on power supply unit is blown.	⑬
	Only Switching-type : Power supply falls.	⑭
	Switch on the operation panel does not work. (Carriage moves to home at power on.)	⑮
	Neither spacing nor printing is performed and POWER and SELECT lamps are lit (USB interface).	⑯

< For Dropper-Type >



< For Switching-Type >

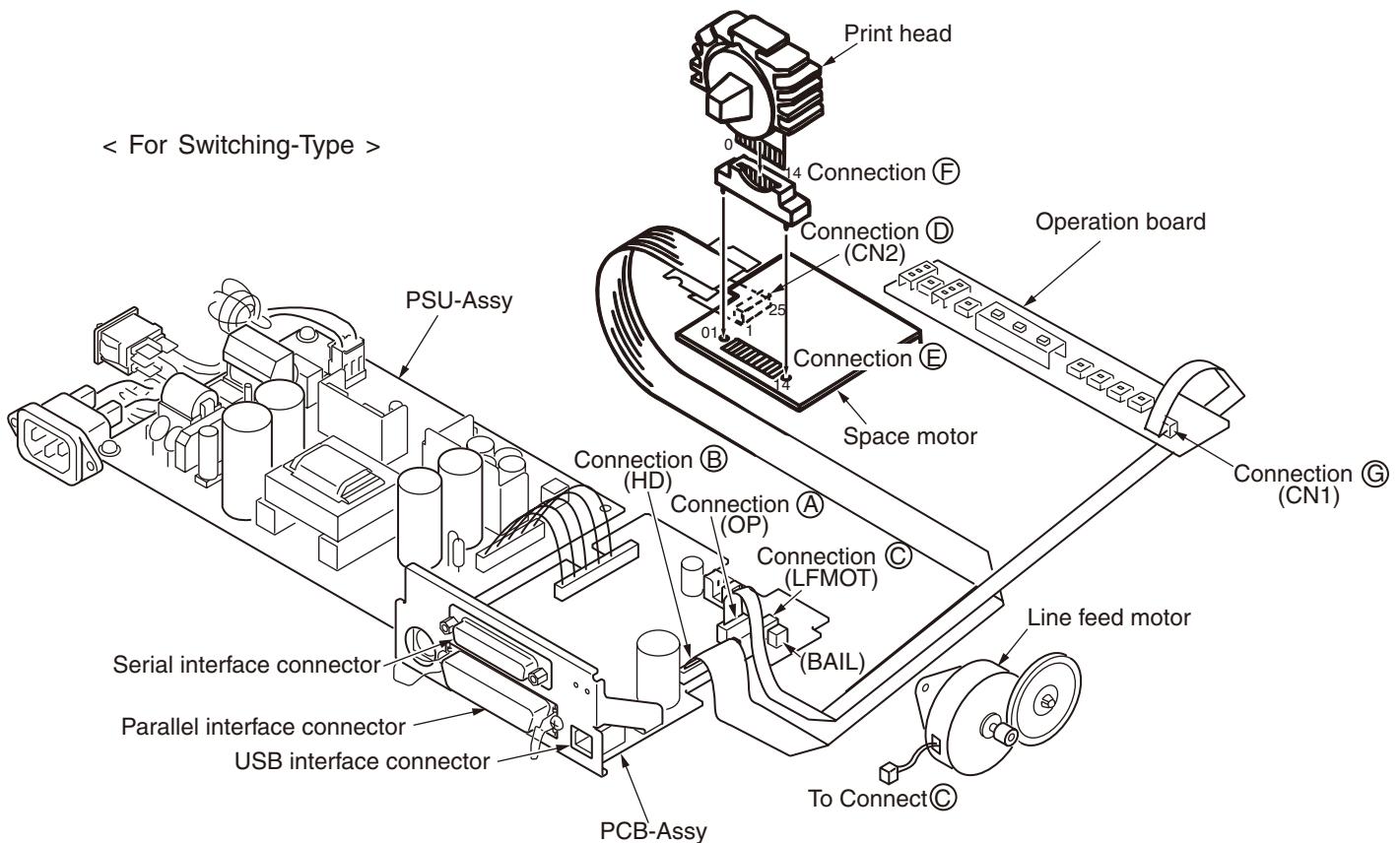
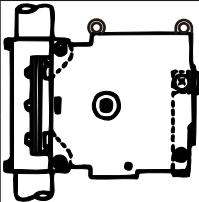
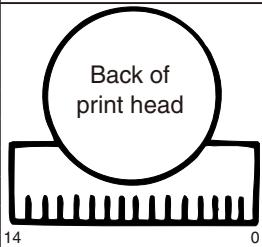
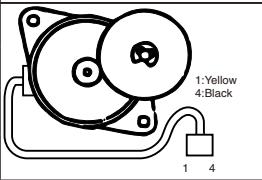
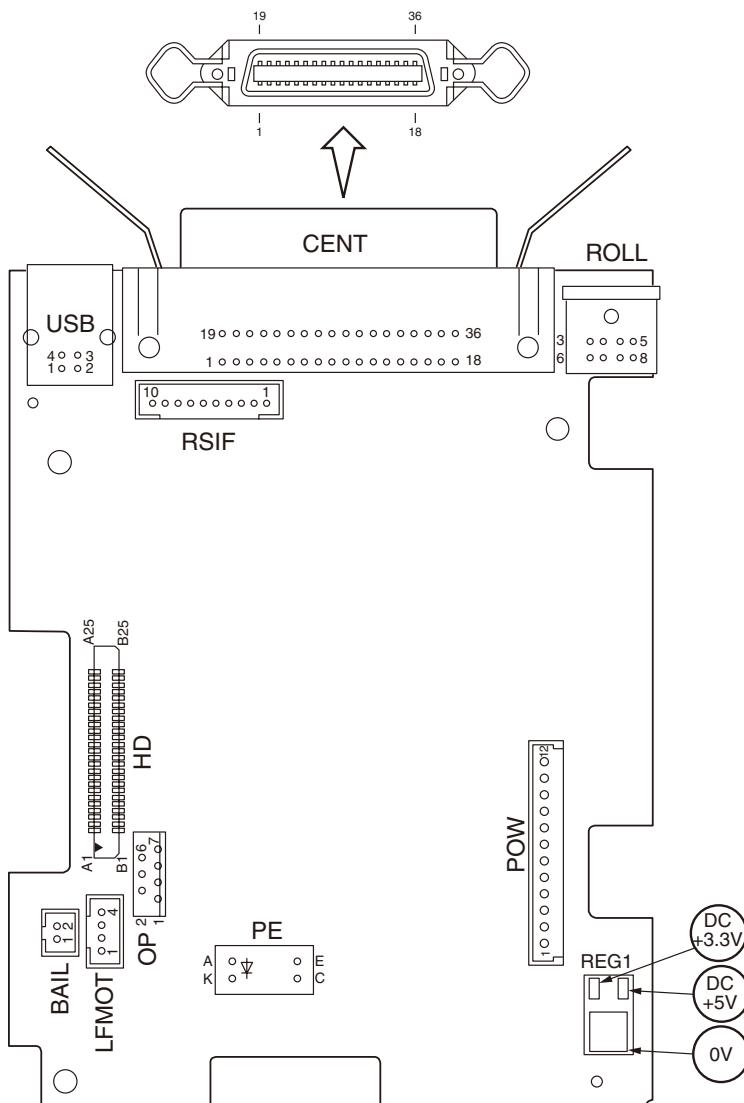


Figure 6-1 Connector Locations and Numbers of pins

Table 6-2 Pin Numbers and signal Names

Name	Signal Name	Connection						Coil Resistance	Figure
		A(OP)	B(HD)	C(LFMOT)	D(CN2)	E	F		
SP MOTOR	SPV		A18,B18		18			Approx. 21Ω	
	SPU		A19,B19		19				
	SPW		A20,B20		20				
	SPA		A24,B24		24				
	SPB		A23,B23		23				
PRINT HEAD	HEAD1		A17,B17		17	14	14	Approx. 20Ω	 Back of print head
	HEAD2		A16,B16		16	13	13		
	HEAD3		A2,B2		2	1	1		
	HEAD4		A15,B15		15	12	12		
	HEAD5		A3,B3		3	2	2		
	HEAD6		A14,B14		14	11	11		
	HEAD7		A4,B4		4	3	3		
	HEAD8		A13,B13		13	10	10		
	HEAD9		A5,B5		5	4	4		
	40V(Common)		A6,B6,A7,B7, A8,B8,A9,B9, A10,B10		6,7,8,9,10	5,6,7	5,6,7		
LF MOTOR	HTEMP (Head Temp)		A11,B11		11	8	8	Approx. 12.6Ω	 1:Yellow 4:Black
	0V		A12,B12		12	9	9		
	A			1					
	nA			2					
OPERATION PANEL	B			3					
	nB			4					
	5V	3					5		
	0V	2					6		
	OP_FG(0V)	1					7		
	OPLT	7					1		
	OPRXD	6					2		
	OPCLK	5					3		
	OPTXD	4					4		

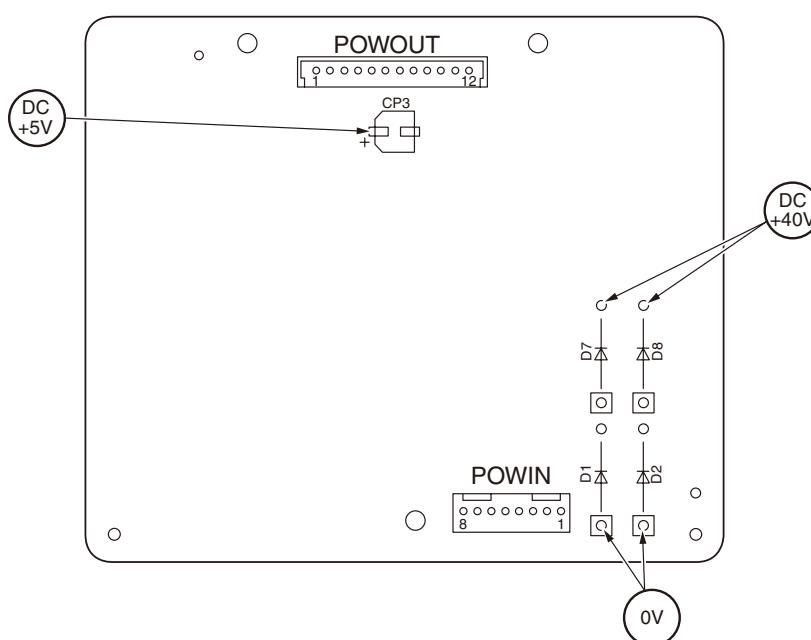
- PCB-Assy(Control Board)



POW Connector

Pin No.	signal
1	+40VLF
2	+40V
3	+40V
4	0V
5	0V
6	0V
7	0V
8	0V
9	+5V
10	+5V
11	ALM-P
12	POWSAVE-P

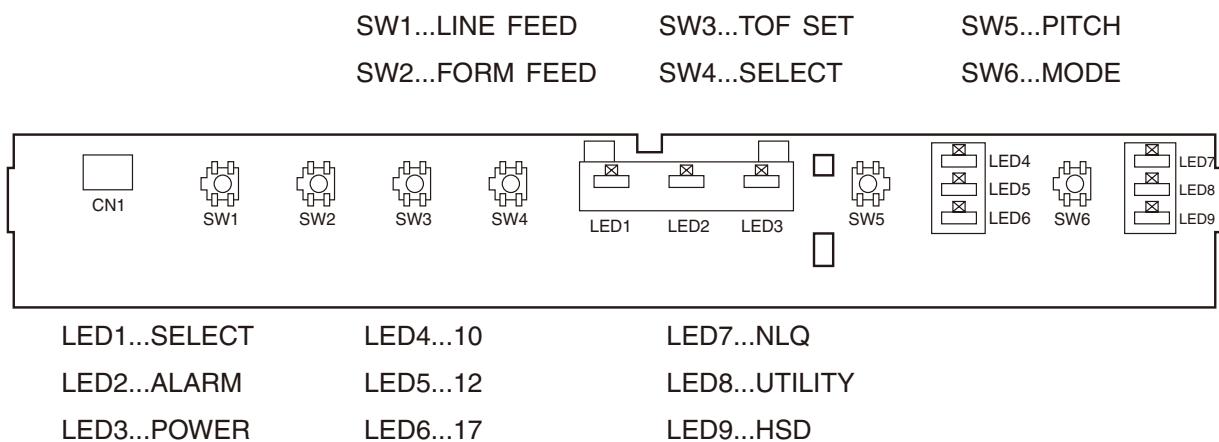
- Commutator-Board (Only Dropper-Type)



POWOUT Connector

Pin No.	signal
1	+40VLF
2	+40V
3	+40V
4	0V
5	0V
6	0V
7	0V
8	0V
9	+5V
10	+5V
11	ALM-P
12	POWSAVE-P

- Operation Board



- PSU-Assy (Only Switching-Type)

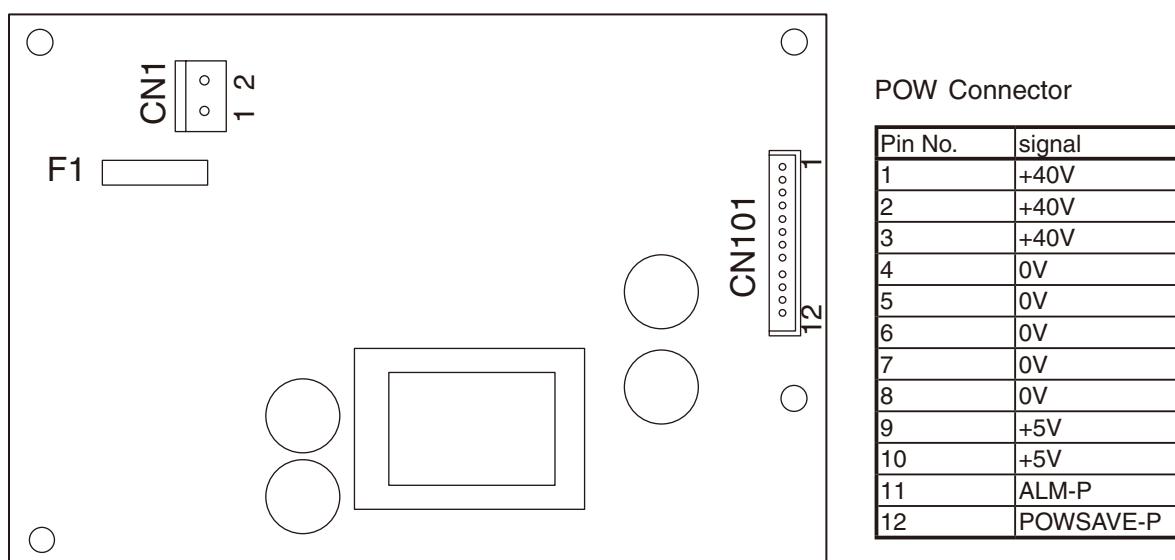


Figure 6-2 Check points for Printed Circuit Boards

6.3 Troubleshooting

①

Power is turned on, but carriage does not move.

In the case of Dropper-Type :

- Is the AC cable connected correctly?

YES NO

- Connect the AC cable correctly.

↓ Is POWER LED (LED3) lit?

NO YES

- to step ② .

↓ Is fuse F1 of power supply unit blown?

NO YES

- Replace fuse F1 of power supply unit. If it blows again proceed to ⑤ .

1-a Power is turned off.

↓ Remove the cable connected to a POW connector of a PCB-Assy.

↓ Power is turned on.

↓ Measure the voltage of 2Pin and 9Pin of the POWOUT connector of the Commutator-Board.

Is 2Pin about 40V ~ 59V? Also Is 9pin about 5V?

YES NO

- Replace the Power Supply unit and the Commutator-Board.

↓ Replace the PCB-Assy.

In the case of Switching-Type :

- Is the AC cable connected correctly?

YES NO

- Connect the AC cable correctly.

↓ Is POWER LED (LED3) lit?

NO YES

- to step ② .

1-b Power is turned off (Wait about 30sec).

↓ Remove the cable connected to a POW connector of a PCB-Assy.

↓ Power is turned on.

↓ Measure the voltage of between 2Pin and 0V, 9Pin and 0V of the CN101 connector of the PSU-Assy.

Is 2Pin about 40V? Also Is 9pin about 5V?

YES NO

- Replace the PSU-Assy.

↓ Replace the PCB-Assy.

(2)

The Power LED lights when power is turned on, but the carriage does not move.

- Are the ALARM LED (LED2) and SELECT LED (LED1) lit?

NO YES

- Replace the PCB-Assy.

• Is the carriage easily moved by hand when the power is turned off?

YES NO

(2-a)

- Remove the ribbon cassette.
- Does the carriage move smoothly?

NO YES

- Replace the ribbon cassette.

• Remove the ribbon feed gear assembly (see 3.3.6).

- Does the gear move smoothly?

NO YES

- Replace ribbon gear feed assembly (see 3.3.6).

• Is space rack OK?

YES NO

- Replace the space rack (see 3.3.10).

• Replace the space motor assembly (see 3.3.7).

• Is +40 V output?

YES NO

- Replace the PCB-Assy or the Dorroper-Type:Power Supply Unit and the Commutator-Board, Switching-Type:PSU-Assy.

• Turn off the power and check each resistance between A18 and A19, A18 and A20, and A19 and A20 pins at the HD connector of PCB-Assy. (connector B).

Note: Be careful not to damage the copper foil on the connection board when measuring the resistance.

- Is the resistance approximately 21 ohms?

YES NO

- to step (2-1)

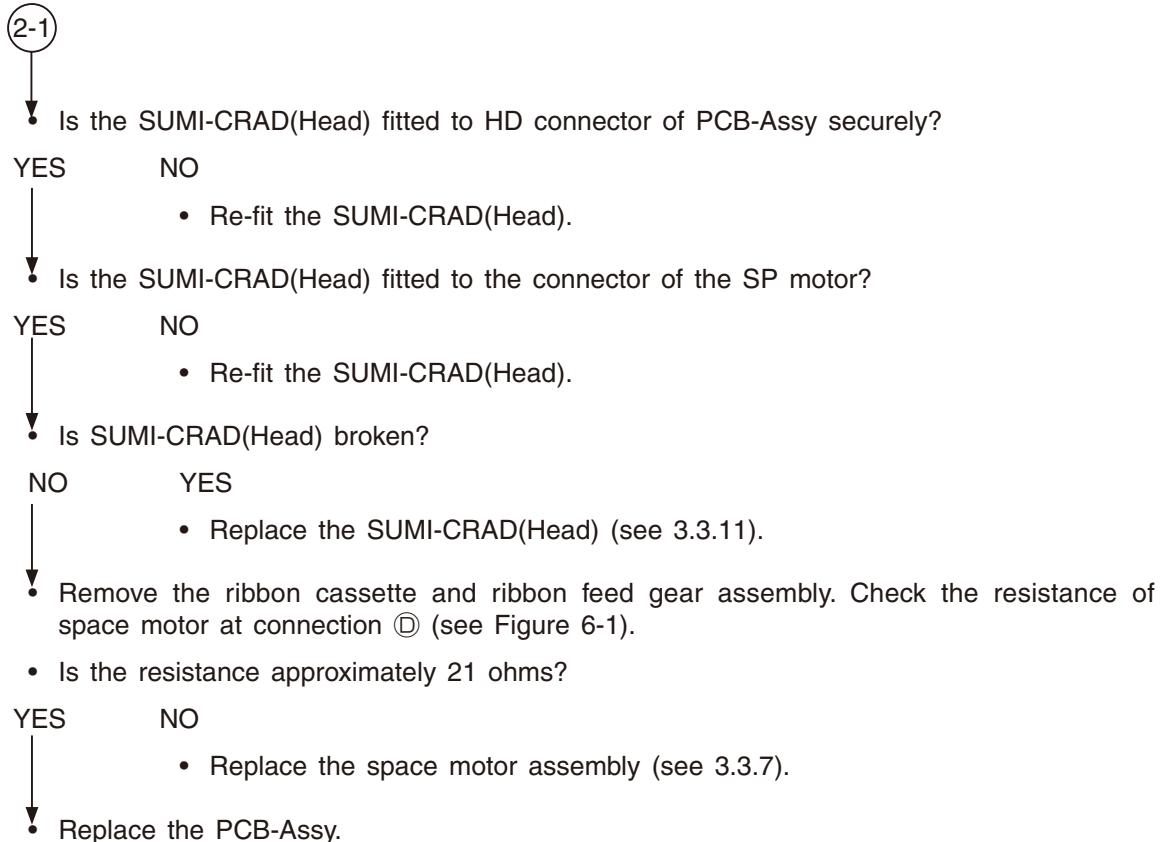
• Replace the PCB-Assy.

- Is the printer normal?

YES NO

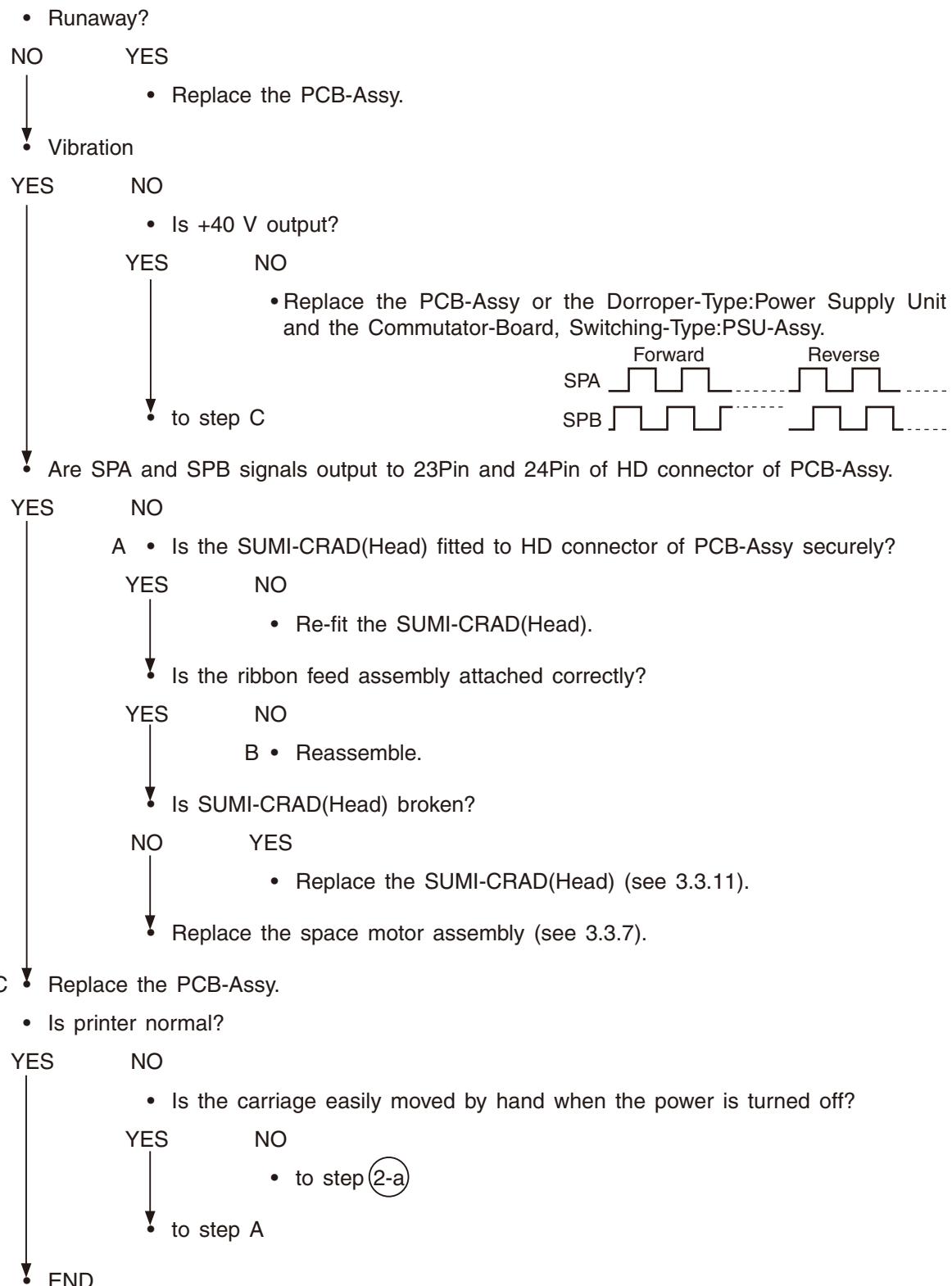
- Replace the space motor assembly (see 3.3.7).

• END



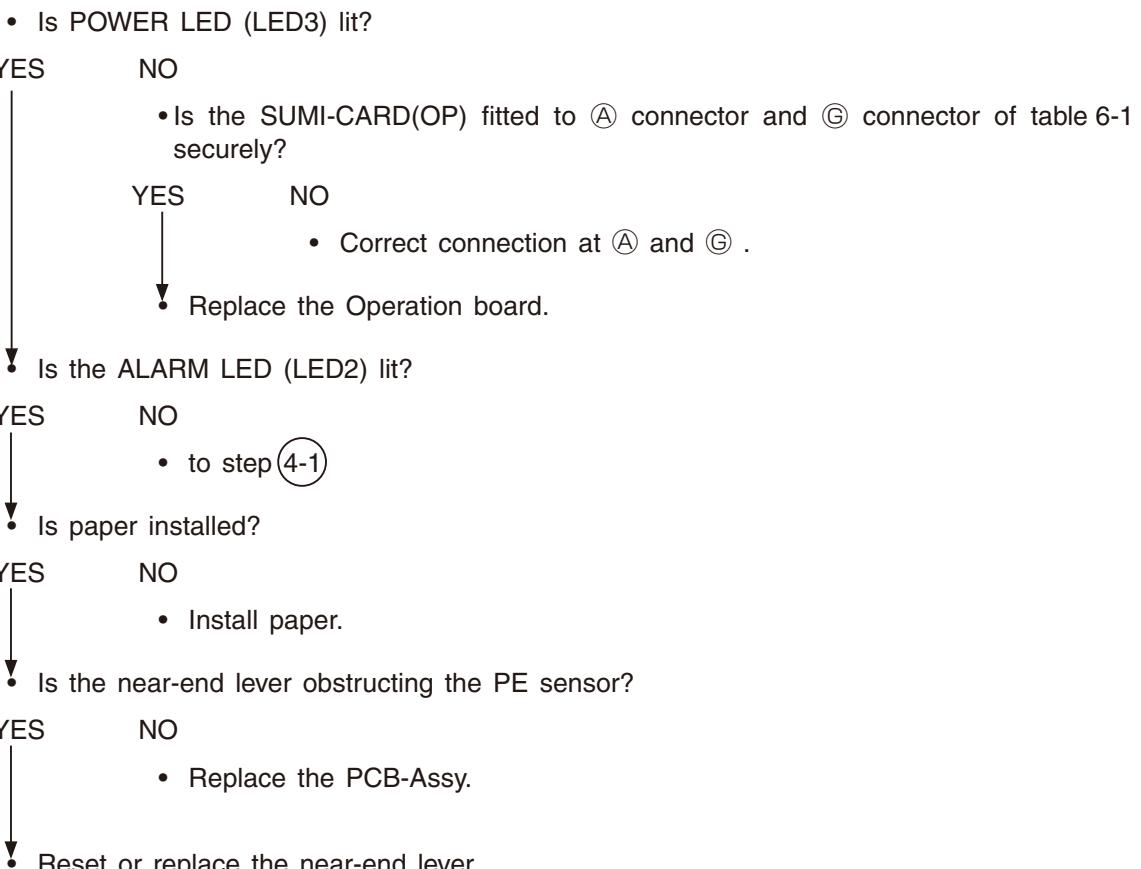
(3)

Carriage movement is abnormal (runaway, vibration, incomplete homing) when the power is turned on.



(4)

Homing operation is normal, but the indicators (LED1 to LED9) are abnormal when power is turned on.



(4-1)

• Is SELECT LED (LED1) lit?

NO YES

- to step (4-a)

• Is paper installed?

YES NO

- Install paper.

• Is the printer in SELECT status?

YES NO

- Press the SELECT switch (SW4).

(4-a) Are 10 (LED4) or 12 (LED5) or 17 (LED6) and NLQ (LED7) or UTILITY (LED8) or HSD (LED9) lit?

YES NO

- Replace the PCB-Assy.

• Is the SUMI-CARD(OP) fitted to Ⓐ connector and Ⓖ connector of table 6-1 securely?

YES NO

- Correct connections at Ⓐ and Ⓖ .

• Replace the Operation board.

Only Dropper-Type:

(5)

Fuse F1 on AC power supply unit blows when power is turned on.

- Is the fuse properly rated?

YES NO

- Replace the fuse with properly rated fuse.

• After Remove the cable connected to the POW connector of the PCB-Assy, Power is turned ON.

- Does the fuse blow again?

YES NO

- Replace the PCB-Assy.

• After replace the AC power supply unit and Commutator-Board, turn on the power.

(6)

Neither spacing nor printing performed while receiving data (parallel interface).

- Verify that data is being sent to the printer.
- Is SELECT LED (LED1) lit?

YES NO

- to step (4-1)

• Are the signal levels at CENT connector of PCB-Assy as shown in the table below with the interface cable removed?

Signal Level

	Signal Level
Pin 10	H
Pin 11	L
Pin 12	L
Pin 13	H
Pin 14	H

NO YES

- Are parallel data signals (pins 2 to 9) and STB (pin 1) received with the cable connected?

YES NO

- Is the interface cable connected correctly?

YES NO

- Correct the interface cable connection.

• Replace the interface cable.

YES NO

- Is self-test possible? (Perform with the interface cable removed.)

YES

NO

- Replace the PCB-Assy.

• Replace the PCB-Assy.

• Replace the PCB-Assy.

(7)

Spacing is normal, but nothing is printed while receiving data.

- Replace the print head.
- Is printer operation normal?

YES NO

(7-a)

- Turn off the power, remove the PCB-Assy, and check the resistance between pins A6, B6, A7, B7,A8, B8, A9, B9, A10, B10 and A2, B2, A3, B3,A4, B4, A5, B5, A13, B13, A14, B14, A15, B15, A16, B16, A17, B17 at HD connector of PCB-Assy (connection board side) of connection ⑧ . (see table 6-2.) **(Note)**
- Is the resistance approximately 20 ohms?

YES

NO

- Is the cord clamp of connection ⑧ and ⑨ firmly attached?

YES

NO

- to step F

• Is the ribbon feed assembly correctly attached?

YES

NO

F • Attach correctly.

• Is the SUMI-CRAD(Head) broken?

NO

YES

- Replace the SUMI-CRAD(Head) (see 3.3.11).

• Is the print head connector deformed?

NO

YES

- Replace the connector.

• Verify that contacts at connections ⑧ , ⑨ , ⑩ , and ⑪ , are not damaged or worn.

• Replace the PCB-Assy.

• END

Note: Be careful not to damage the copper foil on the PCB-Assy when measuring the resistance.

(8)

Printing stops due to an ALARM while receiving data and printing.

- Is the ALARM lamp (LED2) lit?

YES	NO
-----	----

- Wait until the print head cools.

↓

- Is the SELECT LED flickering?

YES	NO
-----	----

- Paper near end. Refill paper.

↓

- Is paper installed correctly?

YES	NO
-----	----

- Install paper correctly.

↓

- Turn off the power and manually move the carriage.
- Does the carriage move smoothly?

YES	NO
-----	----

- to step ②-a

↓

- Is homing performed properly?

NO	YES
----	-----

- Replace the space motor or the PCB-Assy.

↓

- Check items ① to ③.

(9)

Wrong characters are printed or some characters are missing.

- Is interface cable connected properly?

YES	NO
-----	----

- Connect cable properly.

↓

- Does self-test print normally?

YES	NO
-----	----

- Replace the PCB-Assy.

↓

- Is the bit length set properly?

YES	NO
-----	----

- Set the data bit length properly.

↓

- Are data signals 1 to 8 input normally from host to CENT connector of PCB-Assy pins 2 to 9?

YES	NO
-----	----

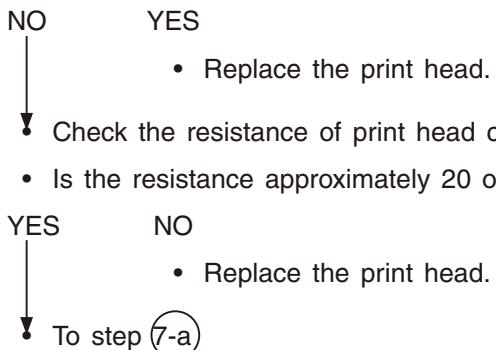
- Replace the interface cable.

↓

- Replace the PCB-Assy.

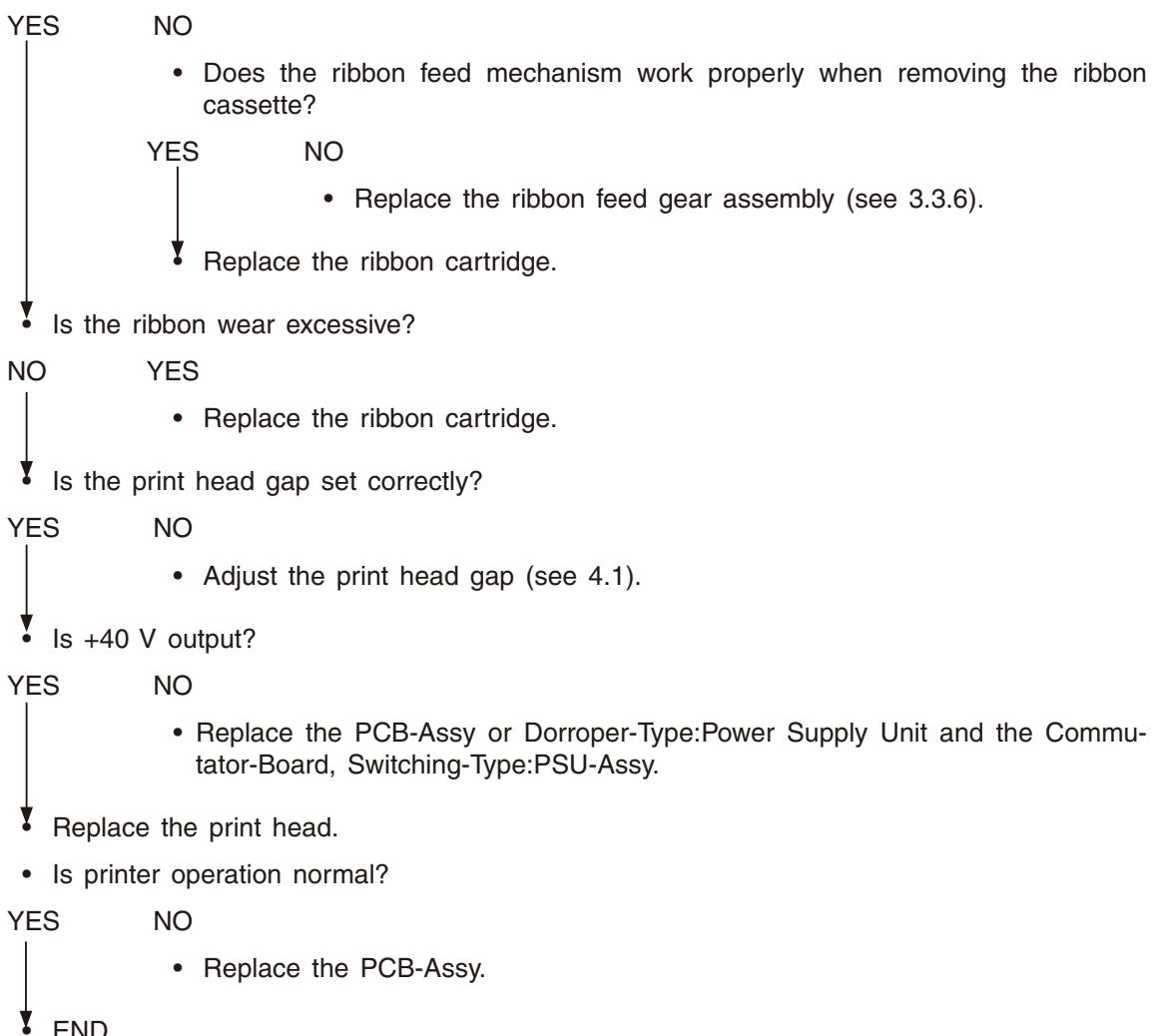
(10) **Some dots are missing.**

- Remove the print head.
- Is any pin broken?



(11) **Print is light.**

- Is the ribbon fed properly?



(12) **Line feed is not performed**

- Is paper installed correctly?

YES NO

- Install paper correctly.

(When single sheet is used the friction lever must be set to closed position.)

- Is the platen unusually hard to turn manually with the power off?

NO YES

- Adjust the paper feed mechanism. (Check for paper jam and damaged parts.)

- Turn off the power and measure each resistance between 1 and 2, and 3 and 4 at LF-MOT connector of PCB-Assy.

- Is the resistance approximately 12.6 ohms?

YES NO

- Is the connector fitted securely?

YES NO

- Re-fit the connector.

• Replace the LF motor (see 3.3.9).

- Replace the PCB-Assy.

- Is printer operation normal?

YES NO

- Replace the LF motor (see 3.3.9).

• END

Note: Be careful not to damage the copper foil on the PCB-Assy when measuring the resistance.

Only Dropper-Type:

(13)

Fuse F1 on power supply unit blows while receiving data and printing.

- Is the fuse properly rated?

YES NO

- Replace with properly rated fuse.

↓

- Turn off the power and check the print head coil, SP motor, and LF motor resistance. (See table 6-2.)

- Is the print head resistance approximately 20 ohms?

YES NO

- Replace the print head. Connect connections ⑧, ⑩, ⑪ and ⑫ properly.

↓

- Is the SP motor resistance approximately 21 ohms?

YES NO

- Replace the SP motor. Connect connections ⑧ and ⑩ properly.

↓

- Is the LF motor resistance approximately 12.6 ohms?

YES NO

- Replace the LF motor. Connect connections ⑨ properly.

↓

- to step 1-a

(14)

Power supply falls while receiving data and printing.

- Turn off the power and check the print head coil, SP motor, and LF motor resistance. (See table 6-2.)

- Is the print head resistance approximately 20 ohms?

YES NO

- Replace the print head. Connect connections ⑧, ⑩, ⑪ and ⑫ properly.

↓

- Is the SP motor resistance approximately 21 ohms?

YES NO

- Replace the SP motor. Connect connections ⑧ and ⑩ properly.

↓

- Is the LF motor resistance approximately 12.6 ohms?

YES NO

- Replace the LF motor. Connect connections ⑨ properly.

↓

- to step 1-b

(15)

Switch on the operation panel does not work (Carriage returns to home position when power is turned on).

- Are connection ① and ⑨ proper?

YES NO

- Correct the connections.

↓

- Replace the Operation board.

(16)

Neither spacing nor printing performed while receiving data (USB interface).

- Verify that data is being sent to the printer.
- Is SELECT LED (LED1) lit?

YES NO

- to step (4-1)

▼ Are the signal levels at USB connector of PCB-Assy as shown in the table below with the interface cable connected.

Signal Level

Pin 1	+5V
Pin 3	+3.3V

NO YES

- Are USB data signals received with the cable connected?

YES NO

- Replace the interface cable.

- Replace the PCB-Assy.

▼ Is the interface cable connected correctly?

YES NO

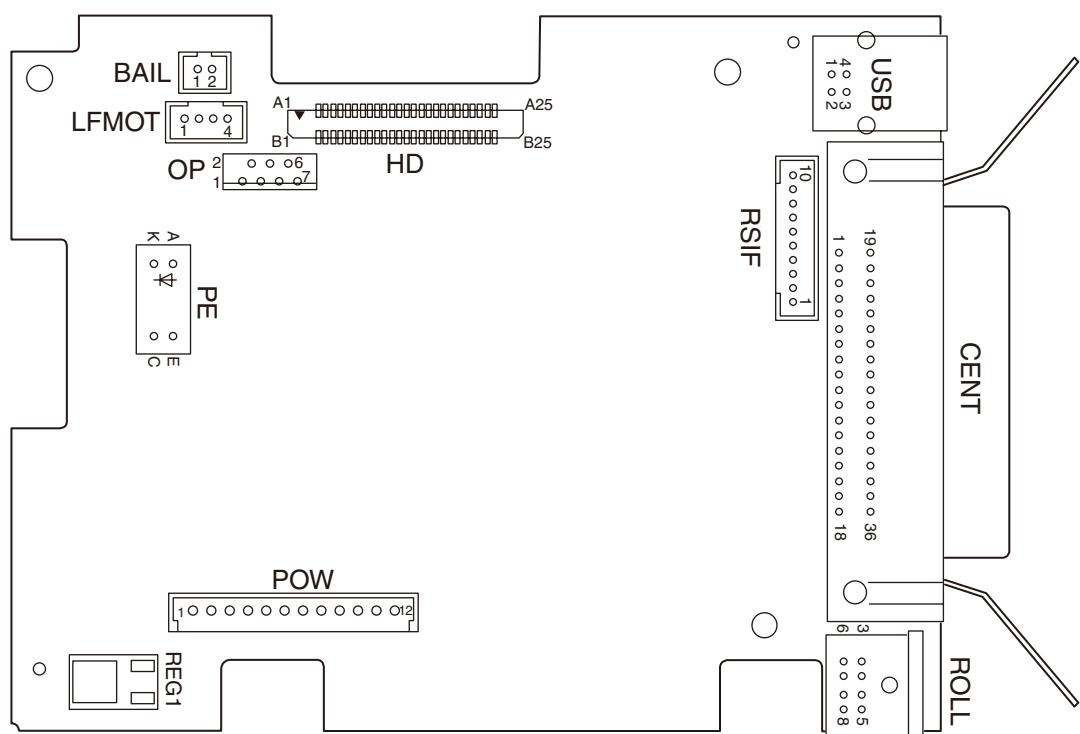
- Connect the interface cable correctly.

▼ Replace the PCB-Assy or interface cable.

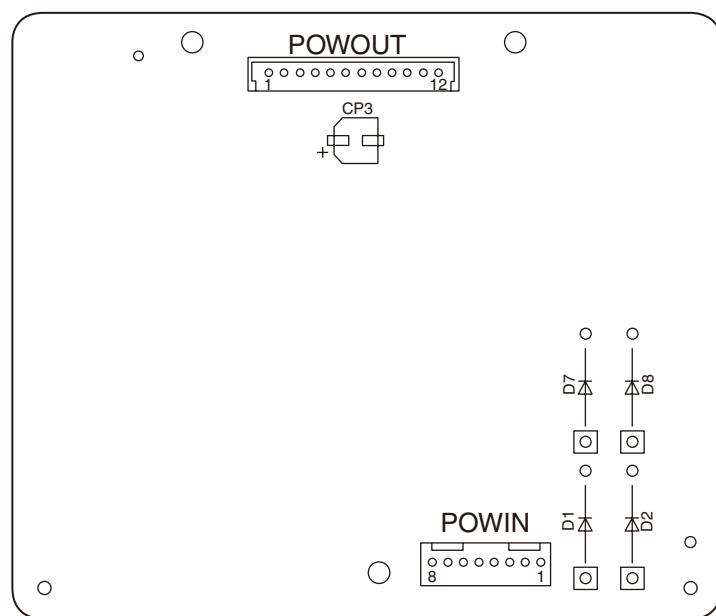
APPENDIX A PCB LAYOUT

- (1) PCB-Assy(Control Board)
- (2) Commutator-Board (Only Dropper-Type)
- (3) Operation Board (Operator Panel)
- (4) PSU-Assy(Only Switching-Type)

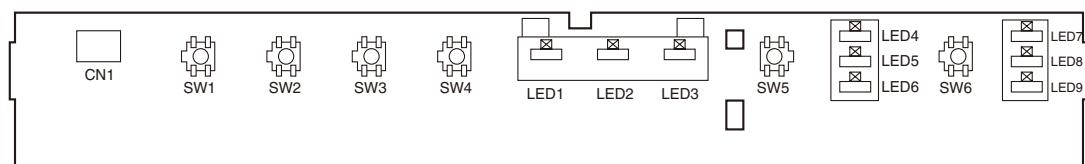
- PCB-Assy(Control Board)



- Commutator-Board (Only Dropper-Type)



- Operation Board



- PSU-Assy (Only Switching-Type)

